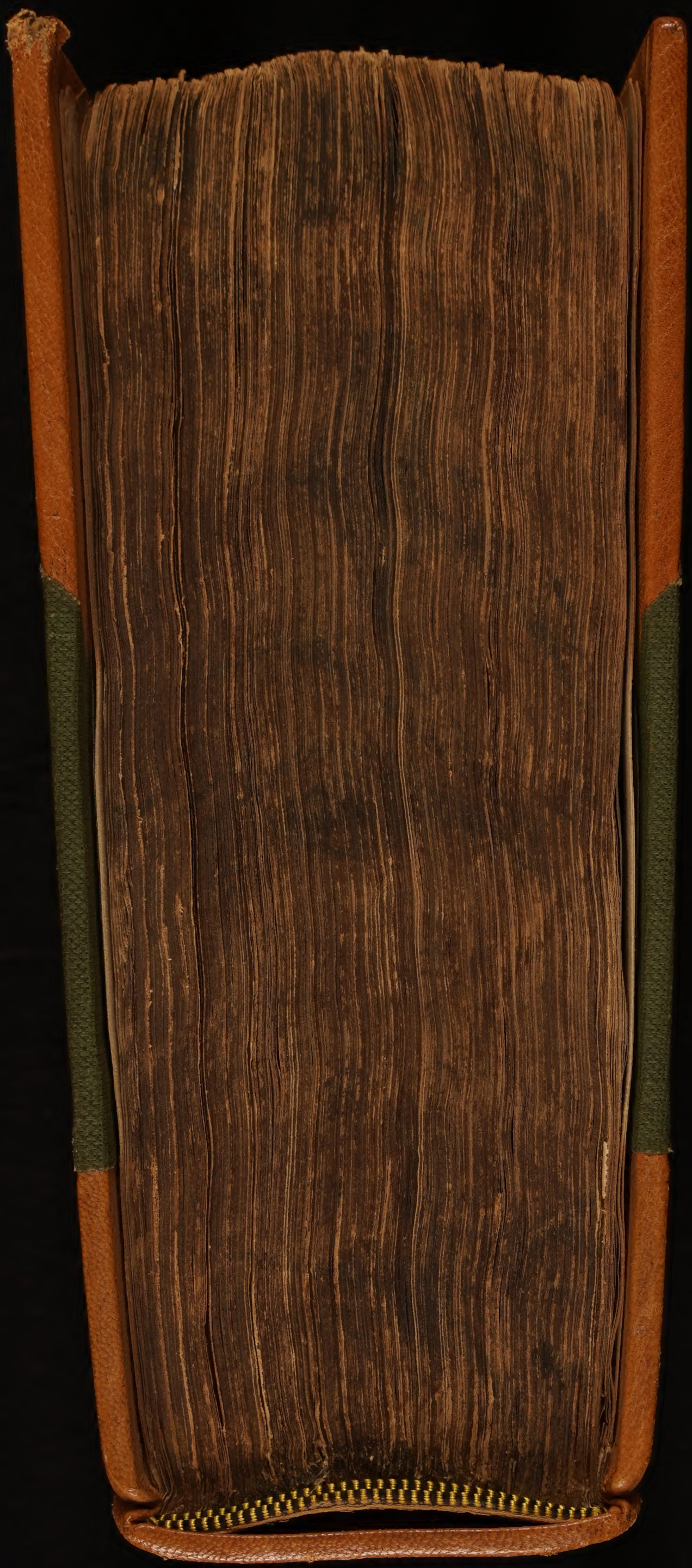
WILLIS

PHARMACEUTICE
RATIONALIS AND
MEDICAL WORKS

1679

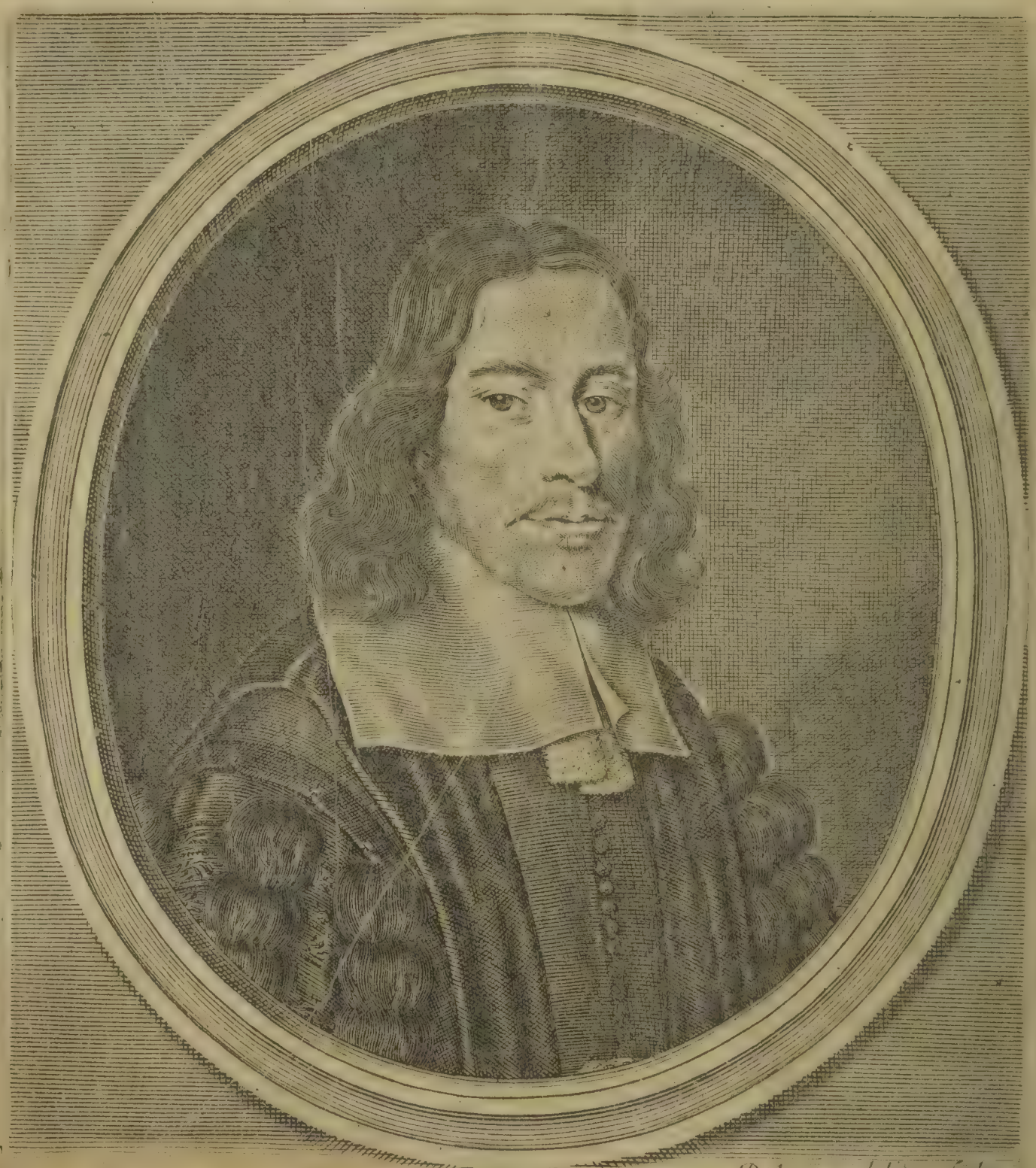
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PHARMACEUTICE RATIONALIS:
OR, AN
EXERCITATION
OF THE
OPERATIONS
OF
MEDICINES
IN
Humane Bodies.

SHEWING
The Signs, Cauſes, and Cures of moſt Diſtempers incident thereunto.

In Two PARTS.

AS ALSO
A Treatiſe of the SCURVY, and the ſeveral ſorts thereof, with their Symptoms, Cauſes, and Cure.

By *Tho. Willis* M. D. and *Sidley* Profeſſor in the Univerſity of *Oxford*: Alſo one of the College of Phyſicians in *London*, and Fellow of the Royal Society.

Licenſed, October 31. 1678. R. L'Eſtrange.

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9—22

THE PREFACE TO THE READER.

WE have observed that it hath been of exceeding great Benefit to many other Arts and Sciences, that Experiments and Observations either by chance or on set purpose being found out, that presently the Ætiology or the reasons thereof, as much as may be, should be set down, which thing we have much desired in Physick, which may be justly placed amongst the noblest of the Sciences. In Mathematicks and Mechanicks experience and practice did first assist the Theory, then this shewing the causes of things and the means of their effecting, hath not only adorned, but very much increased and illustrated the practice. But the Medicinal Art, although at first known to Empiricks, and taken up by quacking Jugglers and old women, as if it were a Mystery into whose Reasons it were not lawful to search, has remained hitherto unexplicated: Wherefore the unlearned, and

indeed ſometimes the learned at this time give Medicines (like People ſhooting at random) raſhly and almoſt fortuitouſly; being uncertain whither they will tend, or what end or effects they ſhall have. From hence it is, that not only ſome learned Cynicks, but the vileſt of the ſcum of the people bark againſt and fling dirt upon Phyſick. And truly I know not how ſhe will be wholly excuſed from being called a Lyar, Vain and Jugler, ſo long as yet the reaſons of curing by medicine, on which the life and health of Man much depends, and oftentimes by which 'tis no leſs indangered, lye hid. But this Doctrine of Medicinal Operations either neglected or ignored, ſhewing like a great Chaſm, hath been the only, or at leaſt the greateſt impediment that Phyſick is not come to its perfection, and its whole Syſtem rightly framed: For though the matter of Medicine gotten from each family of the Vegetables, Minerals, and Animals, ſeems ſufficiently digeſted and compleated, and that the Types and Natures of all Diſeaſes being collected by moſt accurate Obſervations, are explicated by innumerable Authors, and beſides that the humane Body as it were a martial Field, where thoſe Champions try their Skill, be exactly deſcribed as to all its parts by Anatomiſts, yet what is of greateſt moment, and without which the aforeſaid things ſignifie little, is not yet ſufficiently and clearly detected, to wit, what the weapons of thoſe Champions are, what Furniture, what Force and reſiſtance they have, alſo what Action, Paſſion, and Reaction may be between the Particles of the Medicine and the Spirits, Humors, and ſolid parts. But ſince almoſt the whole buſineſs of this Pharmaceutick Drame is acted behind the Curtain, therefore the various congreſſions of Particles, Fermentations, Impulſes, and

other

other diverſities of motions, which performed within ly hid from the Senſes, are to be ſearched out by a more deep Scrutiny of the Intellect, which if it may be at laſt performed, there is nothing more will be deſired, whereby Phyſick being perfected in all its parts, may grow to a true Science and be practiſed with greater certainty not inferior to the Mathematicks. For ſo the Empirical remedies left us by the Antients would not be adminiſtred promiſcuouſly and amiſs (as is wont now by medicaſters) in every ſtate of the Diſeaſe or caſe of the Sick, but opportunely and always according to the moſt apt intentions of healing. Beſides, new and more efficacious Medicines (as often as ſome great and unuſual Diſeaſes require them,) may be eaſily and ſafely found out, without any error of the Phyſician or danger of the Patient. For whilſt it clearly appears what kind of Particles in the Patient are either to be altered or ſtirred up into motion, and what are required in the Agent for that work, it will be no difficult thing aptly to deſign this, and rightly to accommodate one to the other. But the buſineſs is far otherwiſe performed by thoſe Pſeudochymiſts with notable danger and abuſe of the humane Body, who not contented with the uſe of received and approved remedies, bragg that they have framed in their Furnaces no leſs than a great Elixir, a certain Panacea, or an univerſal Medicine, whilſt in the mean time they unskilfully meddle with Minerals, expecting a certain uncertain event rather than deſigning any thing ſeriouſly; If perchance there ſhould appear an unuſual product with this new Medicine (the virtues of which are alltogether unknown, or are none, or poyſonous,) they promiſe themſelves preſently to cure all

Diſeaſes

Diſeaſes, and give it boldly in every caſe to the great hurt, and not ſeldom to the Diſtruction of the Sick; ſo ſecurely and raſhly are theſe Executioners wont to ſport with mans Life, whilſt they are led to the preparing or adminiſtring theſe Medicines (in which always lurks ſome venemous Sting) without any counſel or direction of Method, but by mere chance and with a certain blind undertaking.

Therefore it is highly to be wiſhed, both for the Dignity and Augmentation of Medicine, and for the Cure and ſafety of mans Health, that the Energies and manner, as to the nature of each, and as it were the mechanical means of the working of Medicines in our Bodies might be laid open. For if it ſhall be plainly known by what means Medicines being taken do preſently exerciſe their powers in the firſt Paſſages, and from thence by and by diffuſe them thorow the whole Body, and what alteration they receive in each Region, and what they do or perform upon the Spirits or Blood, and Humors or ſolid Parts, then indeed Evacuation may be much more ſafely and certainly uſed, and with greater Benefit to the Sick.

But if having boldly aſſaulted this Province, to wit, the ſhewing a reaſon of the pharmaceutical Operation before untouched, I ſhall not ſufficiently perform my work, I do however deſerve Pardon becauſe I am forced to travel thorow not only an unknown Cuntry, but alſo one that is uneven and as it were a Labyrinth; and if perhaps going thorow this tract I have not yet ſufficiently found out all the more ſecret Receſſes, and every more intimate Corner, and what is acted in them; yet I ſuppoſe that I have made way for others, who may have a mind

more

more accuratly to find them out.

For truly if theſe two things which I have followed in the whole Diſquiſition ſhould be exactly known, *viz.* By what means Medicines or their Particles affect the Animal Spirits in every place, alſo by what and how many ways they Ferment the Blood and Humours, from thence a Path would lead to the unfolding the Reaſons of every Evacuation. For the better laying open of the ways of the whole curing by Medicines, we have taken care to have accurately diſcribed the Ventricle and Inteſtines, even to all the Membranes and Fibres of them, in which the Animal Spirits dwell, and where they are firſt of all affected by the Particles of the Medicine. For although the Subſtances, Figures, Cavities, Sites and Connexions of theſe are long ſince ſufficiently enough delineated, yet we have manifeſted moſt clearly without any example or following of any other Authors, the Nervous and Muſculary and Glandulous Membranes of each of them, and ſome Fibres meerly ſenſible, and others motional, as alſo the thick ſet enfoldings of the ſanguiferous Veſſels, and innumerable Glandulas incruſting the Back of the interior Coat from the Mouth even to the Anum, this making very much for the illuſtrateing the pharmaceutical Doctrin: concerning which Anatomical Inventions I muſt acknowledg my ſelf to be beholden (as formerly to ſome others ſo now again) to the Induſtry and ſedulous Pains of the Learned Doctor *King*; and alſo my Friend Doctor *Maſters* hath ſet to his helping Hand, in the finiſhing of this Task.

At the begining of this Work I did deſign to handle the whole Pharmacie and to weigh the reaſons

of

of all or at leaſt its chief Operations: But whilſt this work was under my Hands it grew into ſo great a Bulk through the Fertility of the ſubject, that I was forc'd to break off long before the end, and to finiſh it before I had half done. For beſides the univerſal Medicines whoſe Energies and manner of working we have already deſcribed, there are other remedies (commonly called Specifick and Appropiate) which belong to this Speculation; to wit, which are given to cure either ſome peculiar Diſeaſes, or which are ſaid to reſpect ſome Region or part of the Body. Of ſome of theſe and eſpecially of Medicines proper for the Breaſt I had begun ſome Meditations. But when I conſider that I muſt Sail in a dangerous Sea, every where full of Rocks of Cenſures and Contumelies. I think it no Wiſdom to venture my whole Cargo at once in this weak Bottom, but firſt of all with theſe few to try my Fortune, which if it be proſperous, I may perhaps be leſs affraid to expoſe the reſt of this Nature hereafter.

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THE

Part I.

THE FIRST PART OF Pharmaceutice Rationalis, OR OF THE OPERATIONS OF MEDICINES IN Humane Bodies.

SECT. I.

CHAP. I.

The Design of the whole WORK.

THE Art of Medicine from the first Invention thereof to the time of *Hippocrates* was merely Empirical, as may be found by those who consult the Annalls. For that as several men made tryal of several remedies, if they found any by Experience to be helpful in any Disease, the same was made use of to others also in the like Case. Wherefore, as *Herodotus* tells us, the antient Egyptians did not carry their sick to the Physitian, but set them in the streets and high-ways that they might consult the Passengers for Cure of their Diseases. And so, both the Priests of these and of the Greeks, taking notice by what remedy every one was healed, committing it to writing, they laid up careful in their Temples their observations, that they might on occasion be communicated to other sick people. After this, the Heap of observations dayly increasing, Ἰατρικὴ Physick began to be reduced into precepts and

The beginning of the medicinal Art.

Its increase and progress.

Part 1.

method, and upon this double hinge, almoſt all the whole buſineſs turn'd, to wit that the matter of Medicine with all its furniture, might be aptly diſpenſed, and in ſeveral forms of preſcriptions, and alſo that the *Indicationes Therapeuticæ*, or the ſetting forth of the method of Curing, with the uſe of the medicinal Houſholdſtuff, might be rightly made known. If any one were very skilful in theſe two parts, he was thought to bear away the Bell in the Medicinal part of Phyſick. But truly in this matter, and in the practice of Phyſick we may deſervedly place among the things that are to be deſired, what hath as yet been unfolded by no body, by what order, and by what affection of the parts of the humane Body, Medicines being taken inwardly, or outwardly applyed, do perform their operations, to wit, how and why this vomits that purges, others ſweat, or move to ſome alteration, or operation of ſome other kind; what affinity there is of the parts and particulars in the agent, and patient, or diſſimilitude, pulſion, impulſion, and reaction: and then with what ſtrugling and fermentation they are agitated, when mix'd together, and by what Workmanſhip or Energie they produce their effects. The vulgar Solution of theſe was wont to be, that Medicines did work by certain ſpecifick Virtues, and did exerciſe their peculiar Powers, which thing truly is no more than to explicate the ſame thing by the ſame thing, as if they ſhould ſay that ſome things are Vomits, becauſe they are indued with the faculty of provoking us to vomit. Therefore for as much as this Therapeutic ſpeculation has been almoſt left hitherto untouch'd by Phyſitians, it will ſeem worth the while to enquire into the reaſon as it were mechanically, which way Medicaments of every kind do exerciſe their force in our Bodies, to wit, that at our pleaſures theſe do ſtir up the motion of avoyding the excrements in the Bowels or ſtop it, theſe excite the effervescencie of the Blood and Humours, or reſtrain them, and moreover by what peculiar reſpect they are able to yield comfort, as it were Tribute, to the wants of every part or member, or to irregular parts. Here, although it is not much to the purpoſe in what order the *Species* of Medicines are recited, yet for methods ſake it ſeems good to me firſt of all to ſhew ſome general reaſons of them, and in the next place to reduce them into *Claſſes*. Therefore as to the operations of medicines we ought chiefly to diſtinguiſh the places in which the virtues or their Energies do firſt and chiefly ſhew themſelves, which commonly are wont to be divided into three Regions: *viz.* Firſt, into the firſt paſſages, in which chiefly are comprehended the Ventricle, Inteſtines, the Pipe of the Gall, and Pancreas, and alſo the Mouths of the Meſeraick Veſſels. Secondly the Maſs of Blood and all its Sanguineous Appendices, to wit, the *Præcordia*, the Liver, the Spleen *&c.* Thirdly, the Brain, and all the Syſtem of the Nerves, with the Members and the habit of the Body. Beſides theſe diſtinct Spheres of Activity, of which ſometimes theſe or thoſe apart from the reſt, ſometimes more, or all together are reach'd by Medicine. In the ſecond place likewiſe we ought to conſider the immediate Subjects on which Medicaments do operate, and thoſe are not doubtleſs the ſolid Parts, but are either the animal Spirits, or the Humours; nevertheleſs they alſo by the means of theſe are ſometimes affected. Medicines inwardly taken, do act either immediately upon the animal Spirits, thoſe which reſide in the Fibres of the *Oeſophagus*, of the Ventricle, of the Inteſtines, and in the firſt paſſages of other leading Pipes; or by means of the Blood upon thoſe which do inhabit the Brain, and the nervous or membranous Fibres of more diſtant parts. When the Virtue of the Medicines touch them, whether theſe parts or thoſe, they ſtir them up either by irrirating them into an extruding motion, or by comforting them make them expand themſelves more largely, and as it were rejoyce, or by aſſwaging qualifie their Diſorders, and take away their Pains, or laſtly by ſcattering them, they lull their Furie aſleep. The Humours in which Medicines inwardly taken do impreſs their force, are both the Ferments, and Obliniments of the Ventricle and Inteſtines, The Blood with the nouriſhing *Succus*, and droſs, *viz.* the *Serum* or Whey, either *Bilis*, the Pancreatick Juice the wateriſh Humour; and alſo the nervous Liquor: upon which ſometimes ſingly, and ſometimes together, Medicines do diverſely operate, in as much as they fling them down and deſtroy them, or reduce them from that ſtate: Sometimes they ſtir them up when ſloathful, or if too much boyling, they allay and gently aſſwage them, or laſtly they alter them being enormant in Quality, Conſiſtencie, Temperament and other Accidents, and ſenſibly reſtore them to their gennine Conſtitution.

The ſhewing the reaſons of medicinal Operations deſired.

The Reaſon of theſe things enquired into mechanically.

The Places of the operations of Medicines in the firſt place noted.

The Subjects of them the Spirits and the Humours.

After what manner Medicines do work upon the Spirits.

The Spices of the Humours recited.

After what manner Medicines act upon them.

Conſtitution. When therefore there are ſo many and ſo various Conſiderations about the Operations of Medicines, the thread of our method leads to the places in which their forces do firſt and moſt chiefly appear; and in that reſpect we will begin with Catharticks, both Vomitory and Purging: Then we will handle next Diuretick Medicaments, Diaphoretick, and Cordials: and laſtly we will ſpeak of Opiats and Specificks, as they are vulgarly called, that is, of Medicines reſpecting, either the defects, or inequalities of the inward parts of each particular Member. In the handling of each of theſe, we ſhall obſerve theſe three things *viz.* Firſt, We will ſhew in every kind of Evacuation the means whereby Medicines do operate and affect, either the Spirits, or the Humours of humane Bodies, or both of them, and with them alſo the ſolid parts. Secondly, We will take notice of all the Kinds of every Claſs of Medicines, or at leaſt the chief of them, together with the more ſelect forms of Preſcriptions. Thirdly we will deſcribe the Chymical Remedies of the firſt rank which belong to each, and the Reaſons of them, that is, the Variations of Changes and Accidents which happen in their preparations, as alſo we will add the reaſons of their Virtues and Effects, which appear in them when they are prepared. In the fourth place there may be ſuperadded to theſe another Exercitation in the medicinal part of Phyſick, to wit, that other more elegant, and more profitable proviſions of theſe kind of Medicines, the reaſons of Chymical preparations being rightly weighed, may be found out. But we will reſerve this Inſtitution for ſome other time becauſe it contains Secrets eaſily violated by thoſe raſh Quack-ſalvers, who not without danger to the ſick make experiments dayly of every medicinal Precept they find written, without any Controul. But that which is next to be done is that we deſcribe, briefly and accurately the firſt Paſſages, vulgarly ſo called, in humane Bodies: *viz.* In which Medicines do firſt of all begin to operate, and are as it were the ſtage of every medicinal Action.

Part I.

The deſigned method of this Tract.

Three things to be conſidered in every Evacuation.

CHAP. II.

The Deſcription, Uſe, and Affections of the Parts among which Medicines begin to work.

SInce that Medicines are carried by the ſame ways into the humane Body as Food, and are born every where throw the ſame Pipes, it will be therefore of uſe, for the right underſtanding the means how it is done, as well for the reaſons of the Chyle as of the Evacuation, that we deliniate a certain Scene of the Parts and Inwards, in which either of theſe do act their Comedie. But to do this fully and amply in all its proportions, were to exhibite the Anatomie of the whole humane Body. Wherefore we will only deliniate briefly thoſe parts, into which Medicines are received, and where they begin to operate. Theſe are then the *Oeſophagus* or mouth of the Stomach, the Ventricle, and the Inteſtines with their appendices, in which not only Vomits and Purges, but alſo Cordials, Opiates, Diaphoreticks, yea and all other kind of Medicines, do firſt of all manifeſt their Virtues, and are determined to ſhew their Energies. We will not therefore give you a perfect deſcription of theſe (which hath already been done accurately by other Anatomiſts,) but only brief Commentaries, which may ſerve to illuſtrate the buſineſs of Evacuation. Since then all Medicines more immediatly act upon the Spirits, or the humours, or on both together, and that the Subjects of them are the Fibres, Membranes, Veſſells, and leading Pipes, we will particulary declare how theſe abide in the aforeſaid Inwards, and how they are wont to affect.

The firſt paſſages. viz. *The Mouth of the Stomach, Ventricle, and Inteſtines, are the Stage of every medicinal operation.*

The Spirits, and the Humours, the immediat ſubjects of Medicines.

The mediat are the Fibres, membranes, veſſels and leading Pipes.

The *Oeſophagus*, according to the opinion of all Men, and common Obſervation, conſiſts of three Coats. The interior of theſe hath as it were a certain Covering on its innermoſt Superficies, conſiſting in Fibres, as it were very ſmall Hairs which covers its hollowneſs all over as it were with a certain Down; the reſt of the ſubſtance of this Coat, is altogether nervous, endued with Fibres of various kinds, and diverſely interwoven, like to the interior Coat of the Ventricle and Inteſtines

The Oeſophgus *conſiſts of three Coats.*

The more inward Coat full of Nerves, and covered with a hairy Cruſt.

Part I.

ſtines. Moreover this Membrane is continued to that which covers the Palate, Mouth, Jawes, and Lips: and alſo deſcending down even to the Ventricle, compaſſeth about its Mouth, and covers it round below on the inſide of the Mouth, for the ſpace of three Fingers breadth. This extreme part, within the Orifice of the Stomach, of this Nervous Coat, which is ſomewhat thick, and hairy, appears very diſtinctly from the more inward Coat of the Ventricle which it covers; which by a ſmall Elixation may be more fully diſcerned; for then that Coat coming down from the Throat, appears wonderfully white, and otherwiſe, and more inward than that of the Stomach. This part without doubt ſerves chiefly to make the ſenſe exquiſite. Hence therefore grateful things being eaten, and ſwallowed down, a grateful affection of pleaſure accompanies them even to the entrance of the Ventricle: ſo alſo from ingrateful things eaten, or thought upon by an irritation here made, there oftentimes follows Nauſeouſneſs and Vomitings. Moreover the deep letting in of this Coat into the Ventricle makes that intimate and quick intercourſe between the Stomach and the Throat; ſo that if either part be provoked to Vomiting, preſently the other is led by conſent: and ſince the ſame Coat cloaths alſo other parts of the Mouth and Palate, theſe in like manner by a natural conſent are affected in Vomiting.

Covers for ſome ſpace and enters into the Mouth of the Ventricle.

And makes the ſenſe of the luſt in the whole throat and Mouth of the Ventricle.

2. The next Coat of the Throat is ſomewhat fleſhy and thick, as if it were a pierced Muſcle. *Hofmannus* indeed aſſerts it to be a Muſcle and to be obnoxious to the Palſie and to Convulſions. The fleſhie Fibres of this Coat were commonly thought round and tranſverſe: but *Clar. Stenon* hath obſerved them to be ſpiral and of a double order, which mutually ſtrike between one another, and are formed like two Cockles put oppoſite one to another. Upon theſe, as much as I have been able to collect by my own obſervation, the whole *Oeſophagus* ſeems to be compoſed of two Muſcles knit together, which make four parallel Lines with the Oppoſite Fibres, and cutting one another acroſs. This plainly may be perceived, if this middle Coat of the Throat be taken off from the reſt, and the extreme parts being tyed, it be diſtended by inflation, and ſometimes immerg'd in ſeething Water, that the Fibres may be contracted and ſwell, for ſo there will be diſcerned two ſeries of deſcending Fibres with their Tendons. Then if this Coat be turnd on the other ſide, and be likewiſe blown up, the oppoſite orders of the aſcending Fibres will appear to your ſight. Laſtly, if the Coat be cut in two in the middle by the long Tendon, and folded out plain, there will appear two parallel Lines on one ſuperficies, and as many oppoſite upon the other.

The ſecond Coat of the Oeſophagus *or middlemoſt being fleſhy ſerves for motion.*

Two oppoſite orders of the moving Fibres.

3. The third and outmoſt Coat of the *Oeſophagus* which is common to that and to the Ventricle, ariſing from the *Diaphragma* or Midriff (to which it is united as it paſſes throw the Hole of it,) is moſt ſmall and is indued with membranous Fibres only, and they very ſmall.

The third or outmoſt Tunick of the Oeſophagus.

As to the uſe and office of theſe parts, we ſay in General that the inmoſt Coat ſerves chiefly for the ſenſe, the middlemoſt for the office of Motion, and the third that it might be as a covering for the whole: But becauſe theſe are the firſt paſſages, or porch to Evacuation, it will be worth our pains that we inquire a little more largely and particularly into them.

The uſe of theſe Coats.

Firſt then this interior Coat of the *Oeſophagus* which is covered over with an hairy Cruſt as it were a certain Down (which alſo is common to the Palate and Tongue) ſeems to be ſo made for the better invitation to Eating, which is a thing ſo neceſſary to maintain Life, to wit, that whilſt grateful food is ſwallow'd down, it might be able in the whole paſſage of the *Oeſophagus*, to be lay'd hold on by thoſe little hairs, and to ſtick for ſome time to them, that it might impreſs a ſenſe of its pleaſure. But that the Coat it ſelf conſiſts of ſo many variouſly interwoven nervous Fibres is, that it is chiefly made for Senſation, next for ſtrength and firmneſs, as a little basket woven with very many twiggs, and thirdly that that part might be the better extended. But the chief Office of them is to receive the approach of ſenſible things, and preſently do deliver them to the common ſenſe, ſo that according to the affections either to things pleaſing or diſpleaſing there ſtirred up, the motions of ſwallowing or rejecting might be continued, or excited a new.

What the Office of the Hairy Cruſt is.

The nervous Coat is chiefly made for the ſenſe.

Here alſo it may be juſtly inquired into, whether this ſo very nervous Coat, ſo very much interwoven with numerous and various Fibres, may not alſo ſerve for ſome motion? For that it happens that the *Oeſophagus* and its parts are diverſly moved,

Inquired if not alſo for motion.

moved in Swallowing, Spitting, Vomiting, Yauning, and other affections, and when the other inward membranous parts, and chiefly the Ventricle and Inteſtines, are on every ſide moved: It ought to be unfolded how theſe various Actions, or paſſions are executed, and by what Fibres, and after what manner they are affected. Part I.

Fallopius the chiefeſt Anatomiſt of his time, when he had obſerved in the Muſcle (which is the chief or the only Inſtrument of Local Motion) two parts, one of them which conteined the fleſhie body of the Muſcle, to conſiſt of fleſhie Fibres, and the other, which was the Chord or String, of nervous Fibres: and by theſe two the Body only of the Muſcle to move and contract it ſelf, but the Chord only to be drawn, not to move it ſelf; at length he concludes that no particle in the Animal can move it ſelf, unleſs it be Fibrous and hath true fleſh. *Obſerv. Anatom.* p. 412. *The opinion of* Fallopius, *of the motion of the Membranes.*

Agreeable to this we have ſhown lately in a peculiar Tract, that, and how, every motion of Contraction is performed only by fleſhy Fibres, *viz.* Theſe by the ſudden ruſhing in of the Spirits (which leap from the tendinous Fibres) being inflated and blown up, are preſently made ſhorter, ſo that they thereby ſnatch up the parts hanging next them. But truly ſince it very plainly appears, ſome nervous parts, and eſpecially the hollow *Viſcera* or inward parts, not only to be contracted, but expanded, much blown upon, and inlarged into a greater capacity, which cannot certainly be made by the motion of Contraction; and ſince further it plainly appears that the animal Spirits move no leſs among the nervous Fibres, than in the fleſhie, and not only to fill them gently, but ſometimes to leap forth, very much irritated, or thruſt forth more impetuouſly. Theſe I ſay being premiſed, we will not doubt to conclude that the animal Spirits filling the nervous, or membranous Fibres, do not only effect ſenſation, which is their proper function, but alſo certain local motions, to wit, expanſion, or inflation. For whilſt the animal Spirits in their extruſion being agitated, and notably rarified, do more impetuouſly enter into theſe Fibres (which as well as the fleſhie, being diſpoſed not in certain orders but every where about, may be very much attenuated, and in the greater expanſions diſtended, and dilated) there is a neceſſity that the inward parts framed of theſe ſhould be every where blown up, and their ſides on all parts unfolded, and being to the utmoſt attenuated, ſhould be enlarged into a greater Capacity. Truly by the inſtitution of Nature, as often as it happens to come to paſs after this manner, it is certainly, that whilſt the parts which the membranes do order, ſtretch under or cover, by this means are expanded, the ſuperfluous Humours, or thoſe that being infixed moleſt them, or ſuch as ſtick to them, might be ſhook off and removed. For this end, and by this means, we think Stretchings, Yaunings and other certain motions of inflation and diſtention to be excited. Wherefore as in Yauning, we find the Pipe of the *Oeſophagus* whether we will or no to be inlarged, and as it were blown up, and ſtretch'd out by a certain wind, we may conclude this affection to ariſe from thence, for as much as the inward Coat of the Throat, that it might ſhake off its too much humidity (wherewith it is grieved) it is ſtretch'd out, and enlarged with a certain thruſting forth of the Spirits. Moreover whilſt we ſtrive to hinder this motion of Yauning (becauſe it ſeems always troubleſome, and unhandſom) preſently the fleſhy Fibres of the outward Coat, are moved to contraction: whereby there ariſes a certain ſtrugling in the Coats of the *Oeſophagus* (which we may eaſily perceive) made by theſe oppoſite endeavours of expanſion and contraction. By what means the animal Spirits do blow upon the membranous *Viſcera* in convulſive Affections, and lift them up, and intumeſie, counterfieting the ſpringing up of live Animals, is ſhown by us in ſome other place. Further, when by ſome incongruous Medicine, or Poyſon, Diſtentions and horrid inflations of the Ventricle or Inteſtines, and that not ſeldom, ſudden and exceſſive riſing up of the whole *Abdomen* happen; they are thus made, in as much as the animal Spirits being highly irritated, and brought to uſe their exploſive force, they run altogether into the membranous Fibres, and extend them to their utmoſt,; that the inward or *Viſcus* which is knit to them is preſently wholly blown up, and as much as it poſſibly may be is enlarged. But we will return from this little diverſion of the membranous Motion, to conſider the uſe of the other Coat of the *Oeſophagus*.

Contraction only performed by fleſhy Fibres.

Expanſion cauſed by the nervous Fibres.

As in Stretching, Yauning, and Inflations of the inward parts.

How Yauning is made.

The Extenſion of the membranes cauſed by the thruſting forth of the Spirits.

The exterior Coat of the Throat, ſomewhat fleſhy, and thick, for that indeed it

Part I.

it conſiſts of two orders of fleſhy Fibres, which aſcend and deſcend obliquely, and ſhoot mutually one through the other, may be thought to be as it were a double Muſcle, and as one order of the double Fibres deſcending, ſerves for ſwallowing, the other without doubt aſcending, performs the buſineſs of Spitting, and Vomiting. I have known ſome by reaſon of a vehement Palſie in this fleſhie Coat of the *Oeſophagus*, to have ſwallow'd with very great difficulty, and others by reaſon that theſe Fibres where wholly looſned, to dye with Famine. Beſides, it may be ſuſpected that the ſenſe of being ſtrangled, and that round thing which aſcends in thoſe, labouring with the Hyſterical paſſion to be from the Nervous Fibres of the inward Coat, whilſt the Spirits in them are driven forth, being too much inflated and diſtended, 3. There is not much to be ſpoken of the outmoſt Coat of the *Oeſophagus*, which is common; for this conſiſting of moſt ſmall, and membranous Fibres, ſeems almoſt to be only for a Cover to its inward parts.

The middlemoſt fleſhy Coat of the Oeſophagus *conſiſts of two orders of motional Fibres.*

Its outermoſt Coat.

The Ventricle (in which the *Oeſophagus* ends, thruſting its nervous Coat into its left Orifice) is ſomewhat long, like a Sleeve with a more ample bottom, ſpreading it ſelf Orbicularly, with a plain, and ſhort top, in which are two Orifices, placed one againſt another, at ſome diſtance: By that on the left ſide, the food that is taken in, deſcends by a right and perpendicular Pipe into the Cavity of the Stomach, where it is diſſolved, and changed into Chyle; By the right hand door, whoſe paſſage is oblique, aſcending again, it paſſes thence into the Guts; ſo that whatſoever goes out of the Stomach at either door, muſt be by a ſteep aſcenſion; and as the Ventricle purges it ſelf of what is contained within it on the left ſide, by Vomiting, or on the right ſide by Seige, there is a neceſſity that its bottom, and ſides ſhould be contracted together, and to widen upwards and to incline either to this or to that Orifice.

The Deſcription of the Ventricle.

So much for the Faces of the Exterior part of the Stomach: but we will more largely conſider its inward parts (which belongs to Evacuation) its Coats, with the textures of its Fibres, its Orifices, Veſſels, and leading Pipes, and alſo the Actions, and uſes of them all. The Ventricle as well as the *Oeſophagus* conſiſts of three Coats, one common with the *Diaphragma*, and two proper, outward, and inward.

It hath three Coats.

This innermoſt is wholly nervous, and (as we obſerv'd in the Throat) its inward ſuperficies is every where covered with an hairy ſubſtance, or ſtraight Threds inſerted perpendicularly to the Coat it ſelf (like to ſhaggie Silk.) This Cruſt on the inſide covering the Ventricle, after a little ſeething appears very plainly, but yet diſtinct from that which covers the Throat (being more livid, and more white) and ſeems like that which covers the Tongue. And indeed the ſharp and Cruſtie Superficies, both of the Tongue and of the Ventricle, ought to be ſo, that the particles of the chawed Food, and of what is ſwallowed down, might for ſome time be detained by it, and from thence by degrees delivered over to the nervous Coat, which elſe might by their immediate and naked touch be too much irritated, and afterwards might be in danger of growing hard. Beſides, this hairy Cruſt of the Ventricle ſerves alſo for other uſes; for the reliques of the Chyle, being therein lay'd up and kept for leven, or a certain ferment, they are become requiſite, both for the Appetite, and for Digeſtion. But further this downyneſs on all ſides defends and covers the Mouths of the Veſſels, which are very thickly inſerted into the nervous Coat, and alſo receive the humours flowing off from the Arteries and Nerves; whilſt that in the mean time the Veins ſuck the Chyle, and other overflowing Juices in this part. This hairy Cruſt on the backſide, or convex ſuperficies, by which it ſticks to the nervous Coat, is ſowed all over with innumerable ringy glandulaes, which without doubt do cover the Mouths of the Veſſels, ſticking in the nervous Coat, and as it ſhould ſeem, receive and ſtrain through them the humour deſtinated for them, or more immediatly lay'd up by them.

The Innermoſt is nervous and covered with an hairy Cruſt.

The uſe of the hairy Cruſt.

This covering or hairy Cruſt, may be eaſily ſeparated from the Stomach after it hath been dipped into warm Water, and appears to be a Coat of it ſelf, firm enough, and diſtinct from others, and for the reaſon aforeſaid may not improperly be called the Glandulous Coat. This therefore being taken away, the nervous Coat appears conſiſting of Fibres of various kinds, and diverſly interwoven, by whoſe rare Web *A. A.* innumerable ſanguiferous Veſſels with their cloſe Branches do ſhew themſelves; and terminate in its interior ſuperficies, where they ſtick to the glandulous Coat. The portions of both theſe Membranes, to wit,

This glandulous Coat ſeems to be diſtinct from the other Coats.

wit, the nervous and glandulous are represented by Figures in the fourth Table.

Part I.

This nervous Coat constitutes the interior Cavity of the Ventricle, like to a Chymical Vessel or Matrace, in which the Food is dissolved, and digested into Chyle. Its Fibres chiefly serve for sensation, and perhaps somewhat also for motion. As to the first, these being empty, they stir up Hunger, and being wrinkled up either through Dryness, or Saltness, or Heat, by Spiced Meats, or Wine, they cause Thirst: when sharp and acid Humours do prick or pull them, it causes the Gnawing of the Stomach. Lastly, all Medicines do first of all act upon these Fibres, and according to the sensible impression made upon them, the Operation after this or that manner happens, as shall anon be more specially declared. As soon as these Fibres are filled by fit Aliment put into the Ventricle, presently there arises a certain Satiety and Complacency in the Spirits inhabiting them, and from thence a certain refection and as it were rejoycing by the consent of their whole Convention, or of all the sensitive Soul. In the mean time as the Veins do suck the most subtil part of the Chyle, most rich Food is given to the vital Flame.

The nervous Coat is hid with innumerable Blood-carrying Vessels.

The Office of this Coat as to the sense.

As to the motion of this Coat, although we should deny to it spontaneous Contractions, yet it very manifestly appears, that it is frequently distended, inflated, blown up, and inlarged into a greater Capacity: which comes to pass, not only by the Winds begot within the cavity of the Stomach, but more often by the Spirits inhabiting the Fibres themselves; which, if they be very much irritated and agitated into an explosive Impetuousness, they highly inflate, and distend them all at once, whilst they tumultuously and in heaps run into them, and so intumifie the whole membrane like to a blown up Bladder. For if these nervous Fibres are made hollow and like a Pipe, and that the Wind on a sudden is blown into them, there is a necessity that that Vessel about which they are woven, should be thereby distended and dilated. In like manner also it is when the Spirits, as it were struck with a Fury, do rush more impetuously into them. For this conjunct Cause, the Ventricle, being so affected, is wont to be blown up in Hysterical Paroxysms, and Colicks, and very often in the Hypochondriack passion. From hence also sighs arise, and their reciprocations, which happen, because that the Ventricle, by these Fibres, is sometimes inflated, and sometims thrust back by the *Systole* of the *Diaphragma*. Lastly, deadly and venemous Medicines, in as much as they stimulate the Spirits, and furiously stir them up into these Fibres, they often induce horrid Inflations and Distensions of the other Inwards of the Ventricle, and almost from the like Reason we affirm the Tympanie to arise.

The Affections as to motion.

How the Inflations and distentions of the Inwards are made by the nervous Fibres being affected.

The reason of the Tympany hinted.

This Interior Coat in healthful Bodies has many wrinkles, or folds, shewing themselves in the hollow Superficies of the Ventricle, which seem to be as it were so many Furrows or Inclosures, into which the small portions of the Chyle are scattered here and there, and detained by degrees for the sake of the better concoction, and that they might not flow together into a thick Mass. These Folds are made, for that this Coat is much larger then the exterior fleshy Coat, it is therefore necessary that it should have folds, or wrinkles, that it may be contained by the other. In Gluttons and great Drinkers, in whom by the too often, and too much filling of the Ventricle the fleshy Coat is very much extended, they have also the interior equally extended, all its wrinkles vanishing, it seems plain and smooth like a blown Bladder. The aforesaid wrinkles and folds are expressed in the first Figure of the fourth Table.

How the folds and wrinkles of the Ventricle are made, and for what use.

2. The next Coat of the Ventricle, which is specially and wholly fleshy, consists altogether of fleshy Fibres, and seems to serve only for motion, and that for the Contractive only. But truly the whole Body of the Ventricle is covered with a membrane or this fleshy Pannicle, which draws it together and composes it diversly, for many various uses and offices that it meets with. And for that the Stomach in the work of Chylification, and in the Operation of Medicines, ought to be altered and changed into various gestures, therefore this Coat contains manifold orders of motional Fibres, never enough to be admired. Although it be not easie to describe them being so very intricate, yet because it makes much for the reasons of Evacuation, I shall to my power endeavour to give you this particular Anatomie hitherto almost untouched.

The Fleshie Coat of the Ventricle.

Many orders of motional Fibres in the fleshy Coat.

That you may see this Furniture, let the Ventricle of a Man or Sheep being emptied, having a ligature about both orifices, be inflated, and oftentimes immersed in

How the furniture of the Stomach may be seen.

Part I.

in ſcalding Water, that the Fibres a little contracted may ſwell, until it ſeems half boyled; then the outward Coat or the membrane Covering the whole Ventricle may be noted. The Fibres of this, running from one Orifice to another, compaſs about the Bottom and the Sides of the Stomach, the whole length of them, and they appear to be ſhorter or longer according to the various compaſs of their ſtretchings out, and alſo more ſtreight or more oblique. Moreover in ſome places *viz.* near the Orifices and about the bottom and ends of the Stomach, they are much thicker than in the middle, and there indeed they may be ſeen after a manner fleſhie and moving. The nervous Fibres of this Membrane (as may in like manner be obſerved in moſt of the Muſcles) cut the fleſhy Fibres lying cloſe under them in right angles; ſo that they not only cover them, but bind them faſt, that they may be contained each of them in their orders, and that they may not leap out. The ſecond Table very aptly repreſents this Figure.

Viz. *to immerge it in hot Water.*

Then the outward Coat being obſerved and ſeparated is to be taken off.

Then the order of the Exterior Fibres of the fleſhy Coat will appear.

This Coat therefore being ſeparated, and removed, underneath lyeth the ſeries of fleſhy Fibres in right Angles, which compaſſing about on the ſuperior Plane, the Bottom, and Sides of the Ventricle, even to the depth of it, which is the *Interſtitium* of the Orifices, they terminate in the Orifices themſelves. Without doubt the Office of theſe is, while they are contracted, to draw upwards the bottom and ſides of the Ventricle, and thereby to ſtraiten its cavity, ſo that what is contained therein, being ſpread abroad either towards this or that Orifice, might be evacuated. The exterior or convex Superficies of this fleſhy Coat with the order of motricious Fibres, is exactly delineated in the third Table.

But that its extruding motion might be determinately made, either towards this or that Orifice, and the matter included in the Stomach might be conveyed forth either by Vomit, or by Seige, is the work of the other Series of Fibres, which being tranſverſe in reſpect of the other, bring together one Extremity of the Stomach, ſc. the left or right, againſt the other; So that whilſt the Fibres of both kinds do coact, the Stomach being contracted in all its dimenſions, and broad upwards, doth caſt out what is contained therein by that Orifice to which on occaſion it is inclined. And that there are ſuch Fibres, and that they ly under the former, may be very plainly made manifeſt to theſe who ſhall ſee the other interior or concave ſuperficies of this Coat. Therefore the Ventricle may be ſo inverted, the Orifice of the *Pylorus* being a little cut, and its joyning turned back, that the interior and concave ſuperficies, and the exterior and convex may come together, and then the hairy Cruſts of the interior Membrane with its wrinkles and folds, as is above deſcribed, and elegantly expreſſed in the firſt Figure of the fourth Table, will appear. Then after a light immerſion in warm Water, the hairy Cruſt being ſeparated, and taken away, we may ſee the nervous Coat it ſelf, covered over with a moſt thick Ramification of Veſſels: we have taken care that the portions of either of theſe and the ſuperficies of them, with the Glandula's, and to which of the Veſſels they ſtick, may be diſcerned in deſcribing exactly the ſecond and third Figure of the ſame Table. Then laſtly the nervous Coat being wholly taken away, the interior fibrous Superficies of the fleſhy or middle Coat, as it is delineated to the Life in the fifth Table, appears in view. So that in this Ramification of fleſhy Fibres there is a notable order, which are ſeen to ariſe behind the Mouth of the Ventricle, and to compaſs about its left extremity, and then they are carried forward towards the right region of the Stomach. A notable company of theſe running along on either ſide in ſtreight Lines to the top or ſummit of the Ventricle, enter into the hole of the *Pylorus*, hiding here and there the length of its Cavitie, terminates in the Orifice it ſelf, as it is repreſented in the fifth Figure. But the other Fibres of this Order range on both ſides of the Stomach obliquely, and ſo likewiſe towards its bottom, where they meet. The Office of the former ſeems to be applied to what is to be done by either of the Orifices, by one for the avoyding the excrements, which is done by the lower, and alſo reſpectively by the upper; for the ſame Fibres draw to the right or left, according to the convulſion beginning at this or that end of them; as we have ſhown in our Tract of the motion of the Muſcles, lately publiſhed. If at any time a contraction begins towards the *Pylorus*, whilſt there the bottom of the Ventricle and the ſides are drawn together by other Fibres, both interior, and exterior, its mouth alſo is by thoſe right ones inclined towards the *Pylorus*, therefore what ever is contained in the Stomach is tranſmitted to the Inteſtines. But if the contraction be begun by other Fibres at the end of theſe, towards the mouth of the Ventricle, whilſt there, its

How the order of the interior Fibres may be found out.

Their deſcription.

The uſe of its Fibres.

Bottom

bottom and sides are drawn together by other Fibres, the *Pylorus* also is drawn together towards it, for the action of Vomiting. As to what respects the other oblique Fibres of this order, whilst by a Convulsion beginning from the right end of them, they are drawn downward and obliquely, by their motion they incline the left chamber of the Ventricle towards the bottom and *Pylorus*, cooking for nourishment, what is there more strictly compressed and rolled together: On the other side also, by the Convulsion begun from the left, they being contracted upwards and obliquely, cause the bottom and right chamber of the Ventricle to be snatch'd up towards its mouth, to excite Vomiting. According to either of these contractions, the exterior fleshie Fibres, constituting the convex superficies of the middle Coat conspire in the action, so that they strain more the cavity of the Ventricle, and more aptly compose the endeavours for evacuation upward or downward. Wherefore according to which, an irritation being here or there made, a contraction begins either towards the *Pylorus* or the mouth of the Ventricle, and the whole capacity of the Ventricle being collected, and brought upwards, it is inclined hither or thither, and endeavours to cast forth either above or below. We have taken care that either superficies of this Coat, and the distinct series of the motricious Fibres therein, be exactly described in the Figures of the third and fifth Table. I shall not in this place reherse and explicate every species of contractive motions, which this fleshy Tunicle of the Ventricle hath; of which sort are such as are wont to be stirr'd up in those that are affected with the Cramp, we shall shew them in another place, and we will declare how they are moved by the operations of Medicines, when we shall treat of each in their kind. In the mean time we will take notice of those motions to which this fleshy Coat is wont to obey, the Instinct or Impulse diversly to be communicated, *viz.* First of all, and chiefly from the nervous Coat lying under, which, as from the contents of the Ventricle it is variously affected, by and by, for retention or expulsion sake provokes into contractions of this or that sort. But the Nerves inserted into this fleshy Coat, carry to it the various instincts of motions from the ἐγκεφάλος the neighbouring parts, or remote from above or from beneath. From hence the Ventricle is oftentimes disturbed, and after divers manners moved by the Phantasie, by the Appetite, yea and by divers affections either of the Soul, or of every part of the Body.

Part I.

The same fleshy Fibres effect opposite contractions.

What contractions the fleshy Tunicle follows: The instinct from whence.

The outward Tunicle of the Ventricle is common to it and the *Oesophagus*, of the same texture and substance, as we intimated even as to the use of it, this being the covering of the whole Ventricle, it cloaths the fleshie Fibres of the under-lying Coat, binds them with its Fibres, and holds them fast together as it were with Twiggs. The Fibres of this membrane (as we have already observ'd) are in certain places more thick, that when the Ventricle is fill'd beyond its measure it might be very much distended. These seem to serve but little for motion, but yet somewhat to sense; although there should be but a very small use of it, for that nothing from without can fall upon it, nor any thing taken in at the Mouth can touch it. But if that some serous Humour or impostume, or constant bilious Suffusion happen on the neighbouring or contiguous parts, for as much as this Coat is much, and often irritated, there is excited in the Stomach almost a continual nauseousness, want of Appetite, and frequent Vomiting, as I have observed in very many that have been dissected after they have been dead. The chief use of this Tunicle is, that being the whole covering of the Ventricle, it cloaths the fleshy Fibres of the underlying Membrane, sustains the Ramifications of the Vessels, and serves as well for the strengthning the Ventricle, as for to conserve its heat. Moreover it is not improbable, that there are in certain places of this Coat nervous Fibres, in the place of Tendons, respecting the fleshy Fibres lying under them.

The outward Coat of the Ventricle very nervous.

And perhaps tendinous.

The Ventricle being after this manner like a sleeve, made up of its three Tunicles, as it were a threefold Garment, hath two doors or orifices, placed on the top, over against one another. One of them on the left side stands for the Insertion of the Mouth of the *Oesophagus* into the Mouth of the Ventricle; and is after the same manner, as if the Pipe of a Tunnel were directed into the hole of a Bladder to be filled: The right and perpendicular Pipe admits whatever is put in and swallow'd down into the Stomach. The other Orifice on the right side is continued by a long and oblique Ascention into the *Duodenum*, and by degrees puts into it the Chyle elaborated in the Ventricle.

The twofold Orifice of the Stomach.

Part I.

The Nerves and nervous foldings belonging to the Mouth of the Ventricle.

Near this Orifice the wonderful Enfoldings of the double Nerve, wandring to the Ventricle, being delated as it were at its utmoſt bound, are plac'd, making as it were a kind of Net wherewith its whole circuit is hidden: Beſides both the hairie, and nervous Tunicle of the *Oeſophagus* cloaths the cavity of this farther; hence it is that the Mouth of the Ventricle being exceeding ſenſible doth wonderfully communicate with the other noble parts, and chiefly with the Brain and the *Præcordia*, ſo that indeed it was not for nothing that *Helmont* did place here the ſeat of the Soul.

The deſcription of the Pylorus.

The other Orifice commonly called the *Pylorus* on the right ſide of the Stomach having a capacious hole, by degrees grows long and narrow, and ends in a ſmall hole, and from thence being retorted it is continued into the *Duodenum*. Here the Tunicles are much more thick than in any other place of the Ventricle. The nervous innermoſt is very rough with wrinkles and furrows, and is lifted up into the very hole it ſelf, in a longiſh lump like to the Pipe of a Gutter, for the end certainly, that the Chyle going forth by degrees may not be ſuck'd back again into the Stomach. The fleſhy Tunicle, as every where beſides, hath two ſeries of Fibres; for ſome compaſſing about the Hole they bind it, and as occaſion ſerves, ſhut it faſt; and others being carried by its ſides the whole length of them, gathering together the other parts of the Stomach upward, do lead towards this door. But on the other ſide, theſe Fibres by reaſon of the contraction being at the other ends of them, do often draw the *Pylorus* towards the left Orifice, as in Vomiting: and if ſo be the Convulſion be long continued, the *Duodenum* is drawn upward, and for that reaſon, Choler and the Pancreatick Humours are drawn forth into the Ventricle.

The Office of the Pylorus.

The Office of the Pylorus is, not only largely to tranſmit what is contained in the Ventricle, and together in great heaps, to the Inteſtines (which indeed it frequently doth in purges and *Diarrhæas*) but rather the Chyle being well digeſted, to receive it into its boſom, and to keep it there for ſome time, and then by little and little and by very ſmall portions thruſt it forth. For truly its den being long, and capacious, it ſeems to be a certain reſting or baiting place in the Ventricle into which a portion of the Chylous Maſs, being more thorowly digeſted and perfected, may retire, and abide in quiet, until another part more crude, and latelier put in, may be more concocted in the bottom of the Ventricle. Hence it is, that when things have been eaten, oftentimes that which is ingrateful is vomited up, the other more grateful meats in the mean time remaining in the Stomach; *viz.* for that there are very many as it were diſtinct Cells in the Ventricle, in which thoſe things put in are divided one from another, and may ſo remain. Moreover it is to be obſerved that vomiting Medicines when they work gently, do only ſtir the parts next the left Orifice of the Ventricle, but if they do more ſtrongly irritate them, they draw from within, and upwards the *Pylorus* it ſelf with the *Duodenum* hanging to it, ſo as to make an Evacuation of the forc'd *Bilis* into the Ventricle.

Veſſels belonging to the Ventricle.

The Veſſels belonging to the Ventricle are Nerves, Arteries, and Veins; the deſcription of the former is exactly enough delivered in our Neurologie: *viz.* That the wandering parile Nerves ending on either ſide of the Stomach give to it notable branches, foldings, and manifold ſprouts; moreover the nervous foldings of the Intercoſtal Pares, being placed here and there in the *Hypochondria* and in the *Abdomen*, ſend very many and eminent branches to the Ventricle: which is the reaſon, that vomiting ſo often ſucceeds in Hyſterick and Hypochondraick Paſſions and in Colicks.

Nerves.

Innumerable Sanguiferous Veſſels belong to the Ventricle.

There belong very many blood-carrying Veſſels to the Ventricle, which may be plainly ſeen, if the Stomach of a Man, a Dog, or a Hog, the Cæliack Veſſels being firſt bound, and cut off, be taken out, and the Orifices being drawn together, it be blown into, it will then be a very pleaſant ſight to ſee the leſſer Truncks of the Veins and Arteries, part of them inſerted in the top of the Ventricle; and part of them in its bottom, which by and by run one throw another into leſſer Branches, and then dividing themſelves again into very little and more ſmall branches and ſhoots, mutually to clip, and on every ſide ſtretched out to creep about the whole compaſs of the Stomach, and with its branchie ſhoots to hide it. Theſe Sanguineous Veſſels tending inwardly, and at length ſcattered in innumerable ſprouts are terminated

Part I.

nated in the inmoſt nervous Tunicle; whoſe interior ſuperficies through the thickneſs of the Puncts in which the Veſſels end, is dyed red and as it were made bloody. This manifeſtly appears if that after the Stomach is immerſed in warm Water, the hairy Tunicle be ſeparated; for then the nervous Tunicle by reaſon of the cloſe endings of the Veſſels ſeems hidden as it were with a little bloody Net.

Which end in the interior ſuperficies of the nervous Coat.

If you inquire into the uſe of them, they are ordained to be the cheif Inſtrument, for to convey the heat which is for concoction and digeſtion in the Ventricle, and hence they convey a ſufficiently plentiful matter and Fire, *viz.* in as much as the Blood growing hot, round about the bottom and all the ſides of the Ventricle, like a Cauldron, it is detained as a perpetual lighted fire; and indeed ſomewhat to this end, that bloody Lake ſeems to be there ſituated. But yet beſides this, theſe Sanguiferous Veſſels as we think, have another, not leſs neceſſary Office, *viz.* The Arteries to lay up ſome humour in the Ventricle, and the Veins to carry away thence perpetually ſome other, ſo that there may be made by their means an immediate and conſtant commerce backward and forward between the Chyle and the Blood.

The uſe of them.

But truly as Aliments being put in are diſſolved not only by concoction, but much more by Fermentation in the Ventricle, and diſpoſed into an homogeneous Chyle, they by a certain ſpiritual Liquor there, which as it were ferment (even as the Barm of Ale ferments other Ale) are imbued: This kind of Humour (and indeed plenty of it is required) the Arteries only can furniſh; and this being conjoyned with the reliques of the chyle ſticking in the hairy Cruſt, without doubt conſtitutes that juice which is commonly called the Ferment of the Stomach. Moreover when from things eaten oftentimes a quick Refection is required, and that truly it cannot be made by the long wanderings of the Inteſtines, and of the Chyliferous Veſſels, what more like way is there than that the Veins ſticking moſt cloſely within the cavity of the Ventricle, ſhould receive a certain more ſubtle portion of the Chyle, and forthwith pour it into the Blood? After what manner the Sanguiferous Veſſels inferted into the bottom and top of the Stomach do hide all its ſuperficies with a thick, and manifold Ramification, is to the life expreſſed in the firſt Figure.

The Arteries carry the fermental Humor.

The Veins receive the nutritious Juice.

3. We will go from the Ventricle to the Inteſtines, which being twofold, to wit, thin and thick, there will be no need here to write the Hiſtory of them all, for that the number of them, and their conformation is already very well known, not only to Anatomiſts, but to every Butcher. In the former, as much as belongs to the medicinal part, there ought to be conſidered firſt their ſite and Fabrick, ſecondly their Tunicles, and thirdly their Veſſels and leading Pipe. The Office of theſe is, to receive the Chyle elaborated and dreſſed in the Ventricle, to ferment it more, and from it more elabourated and perfected to preſs forth the nutritious Juice into the Chyliferous Veſſels. Among theſe Inteſtines Cathartick Medicines do chiefly perform their operations.

The Inteſtine twofold, viz. ſmall and big.

Although there be but one continued Pipe of the ſmall Guts, yet for the diſtinct Offices that they have, they are diſtinguiſhed as it were into three *Stadia*, and as if there were ſo many Guts, have ſo many diſtinct names impoſed on them. In the firſt of theſe the Chyle deſcending from the *Pylorus*, by and by is ſtained with new Ferments, *viz.* Choler and the Pancreatick juice, with which, ſince all its Maſſe by degrees, and all its parts ought to be imbued, therefore every portion paſſeth by a ſwift paſſage into this Region, *viz.* the *Duodenum*. In the next Circuit, to wit, the Jejune or empty Gut, the Chyle fermenting is ſtrained more freed from ſourneſs, and acquires a greater volatileneſs; and as here alſo it ought not to ſtay long, by and by being fermented, it is carried forward, and leaves for the moſt part the pipe empty. Within the third Den, the Chyle being volatiliſed and perfected, is copiouſly heaped up, and ſtays there for ſome time, whilſt the Inteſtine *Ileon* being ſo full of Chyle, ſtrains it a little with is fleſhy Fibres, the more pure and ſubtiler part is preſſed forth to be tranſmitted to the blood, into the milkie Veſſels (and alſo according to our opinion into the Meſaraick Veins) and at length the reſt of the *Fæces*, and almoſt worn out are moved forward to the thick Inteſtines.

The ſite and dimenſions of the ſmall Guts.

All theſe Inteſtines, or the whole Pipe of them, have their Coats formed after the ſame

There are three Coats of the Inteſtines.

Part I.

ſame manner, which alſo do not much differ from the membranes of the Ventricle, unleſs that they are a little thinner. All the Inteſtines, both the ſmall and the thick (except in the beginning and end of them, and a certain part of the *Colon* which is joyned to the *Omentum*) are as it were plainly knit to the brim of the Circular Meſenterie: Concerning which in the mean time it is wonderful, how that theſe Inteſtines which are about ſix Ells long, may be comprehended in that compaſs, that they are not above a Span diſtant from the Centre. Alſo we may obſerve, that the Plane of the Meſenterie is collected into many and great folds, and hath in its Circumference the length of three Ells; moreover that the Circumference of the Meſenterie, that it might preſs together the length of the Inteſtines, doth enfold in every ſingle handful about twelve handfuls of the Inteſtines. As for many reaſons it ought to be made after this manner, ſo chiefly, both that the Inteſtines might ſubſiſt in a little and narrow place diſtinctly, and without confuſion; and alſo that they might be moved, by a ſlow and ſucceſſive motion, and as it were creepingly, from one end to the other. For as much as the Tendons of the motricious Fibres, by which the Pipes or Cavities of the Inteſtines are drawn together, are placed on the Brim or Border of the Meſenterie, it is from this Inward, that the inſtinct of every Inteſtinal motion proceeds, as ſhall anon be more clearly ſhown: In the mean time, we will a little handle the Coats of the ſmall Guts.

How they are tyed to the Meſenterie.

The inmoſt Tunicle has very many tranſverſe wrinkles.

The inmoſt of theſe hath very many tranſverſe Wrinkles, as it were eminent Ridges, which are movable, and are as ſo many remoras of the Chyle, and alſo ſerve to moderate its retention, *viz.* that it paſs not too ſoon, and before it be perfected enough, and throwly preſſed, flow with the *fæces* themſelves to the thick Inteſtine. Theſe Wrinkles, as *Fallopius* hath very well obſerved, for that they are much longer in this inward Coat than the outward, therefore it is criſpie and crumbled. For if this be taken off from the other, and that their foldings be ſtretched out, this will exceed the other three times in the length.

The nervous Coat of them is alſo covered with an hairy Cruſt.

Further, this interior altogether nervous Coat, containing in it the little mouths both of the milkie and bloody Veſſels, is cover'd with the like cruſty Nap as the inſide of the Ventricle, and ſeems to be for the ſame uſe, *viz.* it covers and defends the mouths of the Veſſels, and moreover ſuſteins the firſt approaches of the Chyle, and of other contents, and then delivers them over by little and little to the nervous Coat. But this Coat conſiſting of every kind of Fibres, and conſtituting the inmoſt Chamber of the Inteſtinal Pipe, ſerves firſt of all for Senſation, and provokes according to the impreſſions made on it ſelf, the fleſhy Coat lying over it, to aſſiſt the excretorie motions more ſlow, or more ſwift upwards (but that rarely) or downwards. If at any time the internal ſuperficies of this be ſtimulated by ſharp things contained in it, or incongruous Humours do ſtrike againſt its Fibres, preſently by reaſon of the feeling Senſe, troubleſome griefs and torments are ſtirred up. Beſides this nervous Coat is found to be very obnoxious both to diſtentions by included winds, and alſo to expanſions, and intumifications by reaſon of the Spirits among its fibres. But this beſides its nervous fibres, with which it is diverſly interwoven, is every where covered alſo (as we have before mentioned to be in the Stomach) with a thick or cloſe ramification of blood-carrying Veſſels terminating therein: hence, as we may ſuſpect, the Arteries perhaps do leave every where a certain recrementitious humour in the cavities of the Inteſtines, and the meſaraick Veins, no leſs than the milkie Veſſels receive there a portion of the Chyle, and carry it immediately to the Blood.

Innumerable ſanguiferous Veſſels do terminate in it.

2. *The fleſhy or middle Coat.*

In which is two orders of motricious fibres.

Viz. *of ſtreight and circular.*

2. The ſecond or middle Coat of the ſmall Guts is a little thicker, and altogether fleſhy. Of this there are two orders of motricious Fibres lying under one another. The firſt and interior is ringie, which compaſſing every where with a cloſe ſeries the whole Pipe of all the Inteſtines, or all their whole Cavities, is implanted as it were by a Tendon, on the border of the Meſenterie. The other order is of ſtreight Fibres, or longways, which lying over the others, and cutting them in right angles, ſtretch the whole length of the Inteſtines; and the outmoſt Coat ſeems to be in the place of Tendons to them, which being altogether nervous or as it were tendinous, is wrapped about with an univerſal ſeries of theſe Fibres.

Their uſe is enquired into.

As to their uſe, as it is the buſineſs of the Inteſtines to move forward the Chyle,

Chyle, and the *faeces* part by part, and so indeed by urging it to carry it at length throw all their Pipes; moreover whilst that they themselves are contracted, and abbreviated, so that their Cavities may be straitned to press forth the more subtil part of the Chyle into the milkie Vessels, and Mesaraick Veins, it is very obvious and easy to be conceived, how the aforesaid Fibres do perform this double task: for whilst the circular Fibres are successively or one series after another contracted, they make narrow the depth of the Intestines, and at the same time the long ones being inflated and intumified, they make it more strait, and also make it shorter, so that there will be a necessity that the contents of these inwards, be compressed behind, and urged continually forward. Part I.

What kind of motion the Intestines have.

In the mean time it is not to be thought that the contractions of either kind of Fibres are so great and continual, that all the contents of the Intestines are driven forward altogether from one part to another (although that this doth sometimes happen in purges and looseness as we think) but ordinarily those lighter, and broken Convulsions, but yet made one series after another, and often repeated, do as it were shake the Intestines, so that they make the Chyle and the *faeces* gently to move forward from place to place. But by reason of these shakings of the Intestines, and their often repeated contractions, the Chyle being perpetually agitated, is the more elaborated and easily pressed forth into the Vessells gaping for its reception. But if it be ask'd by what instinct the forementioned Fibres of either kind be provoked into motion, and are determined, now these parts now those, one series after another to contraction, I say that the Intestines have it even as the Ventricle, *viz.* it depends upon the Sense of the nervous motion in either of the fleshy Coats, so that the contractions of that follow the irritations of this. As often as any thing that is disagreeing, or incongruous, impresseth any troublesome sensation upon the nervous Fibres, presently to shake it off, the moving Fibres draw together the affected part of the Intestine, that they might drive away whatever is troublesom.

Their instinct chiefly from the irritation of the nervous Coat.

From what causes the nervous Fibres are wont to be irritated.

First of all the reliques of the Chyle, which after the pure Juice is enough pressed forth, do ordinarily, and gently irritate the nervous Fibres, they becoming decay'd and troublesom; for until the distribution of the Chyle be throughly acted, the moving Fibres being contracted before, lest that it should slide away too soon, they are still, afterwards Convulsions being stirred up behind, they cast it forth as unprofitable. Secondly the nervous Fibres are a little more sharply agitated by Choler, and the pancreatick Juice from their Pipes, also by sharp Humours, and hurtful Suffusions from within the Arteries, whereby the same more often, and more strong contractions succeed. Thirdly yet a more vehement Irritation, and preternatural, is wont to be caused, from disagreeing, and disproportionate Aliments, also from Medicines and Poysons, the last of which but one is a little farther particularly treated of.

Moreover the fleshy and moving Fibres of the Intestines, sometimes by reason of other more remote Causes are stirred up to solutive contractions of the Belly. For violent passions of the Mind or the Body do frequently introduce a *Diarrhœa*, *viz.* in as much as the Spirits being placed among the ἐγκέφαλον or principal parts of the nervous appendix, being more notably disturb'd, forthwith making known their disorder by the Pipes of the nerves or the nervous shoots, to the Spirits inhabiting the Intestines, they provoke them into an excremental Convulsion. After what manner soever the irritation is made, contractions follow, for that the animal Spirits leap forth both from the tendinous border of the Mesenterie into the fleshy annular Fibres, and also from the tendinous Fibres of the outward Coat into the fleshy longitudinal Fibres, both which, whilst they so blow up and intumifie, they thereby do render them more short and contracted. It would be too much from the purpose, any further here to expound what parts the Mesenterie obeys in performing this Peristaltick motion of the Intestines; for besides that the tendons of the circular Fibres are rooted in the border of it, you are farther to be advertis'd that in its Plane the moving Fibres do tend directly from the Centre to the Circumference, the office of which cannot be otherwise thought to be, than that they, according to the instinct here given, being there variously con-

By what reason contractions do succeed irritations.

tracted

tracted, do ſtir up the like contractions, either in theſe or in thoſe parts of the Inteſtines.

Part I.

The outermoſt Coat of the Inteſtines.

We have not much to ſay of the outmoſt Coat of the Inteſtines; this having its riſe from the *Peritonæum*, and being wrapped about the former Coats, ſince it is altogether thin and nervous, it is commonly eſteemed to be only as a covering for the reſt: but yet, as the Series of the longitudinal Fibres do immediatly ly under this Coat, and that none of their tendons are any where elſe to be found, and that indeed this Coat is tendinous, we may very well ſuſpect that the animal Spirits do leap forth of the nervous Fibres of this, for the contractions of thoſe fleſhy Fibres, and that the Convulſion ceaſing, they return back into theſe.

The Veſſels and Pipes belonging to the Inteſtines.

The Veſſels and Pipes, which belong to the ſmall Guts, are the Vehicles either of the Spirits, or the Humours, of the former ſort are the Nerves and their enfoldings and ſhoots, all which we have largely enough unfolded in our Neurologie. What belongs to the other leading Pipes, they are ſuch as either carry the Humours to the Inteſtines, as the Choler-carying and Pancreatick Paſſage, and the Arteries; and after a ſort alſo the Nerves (as we have ſhown in another place diſcourſing of the Colick) or ſuch as do carry away the Humours from theſe Inwards, as the milkie Veſſels, and the meſaraick Veins. Every one of theſe Pipes, and alſo the Spirits, and Humours that flow in them, and moreover either what are contained in the cavities of the *Viſcera*, or that remain in their nervous or fleſhy Fibres, are either Subjects, or Objects of Evacuation, and are wont firſt and immediatly to be affected by all manner of Medicines, but after what ways, the Knowledge ſhall be deſigned in the particular of every kind of Evacuation.

Concerning the biliarie Paſſage, and the Pancreatick Pipe, for as much as ſo many Authors have already ſpoke very much of them, and notwithſtanding the Truth may yet ly hid, or remain ambiguous yet (ſince there is a neceſſity that it muſt be very prolix and intricate) this will be no opportune place to enterpriſe the diſquiſition. What Vomits and Purges act in theſe parts ſhall be ſhown hereafter,

Innumerable Blood-carying Veſſels belong to the Inteſtines.

As to what appertains to the Sanguiferous Veſſels, the obſervation is common, that very many Arteries and Veins do branch themſelves forth thorow the whole Meſenterie, and from thence diſtribute to all the Inteſtines innumerable Suckers. Concerning which we ſhall further advertiſe, as they are inſerted into the outer Coat, a few Suckers only hang to this, but the greater branches, almoſt all of them preſently hiding themſelves within, do run back to the inmoſt Coat in which they terminate, and do ſend forth on all ſides infinite and exceeding ſmall Shoots, which very thickly hide its Superficies.

But it may cauſe a wonder wherefore that there ſhould be in theſe almoſt bloodleſs Inwards of themſelves, ſo great an afflux of Blood deſigned. It is not unlikely that this is only done for the diſpenſing of the heat and nouriſhment, when as the Muſcles and the outward Coats of the Inteſtines are contracted with fewer Veſſels, there had need be the greater plenty in theſe. *Mebius* that he might looſe this Knot, affirms that Nature had given ſo great plenty of Arteries to the Inteſtines, that the excrements of the Mothers Blood whereby the Embryo is nouriſhed, at that time might be carryed away to the Inteſtines. The reaſon of which he ads for that the Inteſtines of the *Embryo* or Infant being newly born contain a black Excrement. But truly this Argument eaſily falls if we grant (as it is likely) with *Harvie* and our late Writers, that the *Embryo* ſucks and receives a nutricious Liquor in at the Mouth in the Mothers Womb, But it may rather be ſaid, that theſe Arteries do purge away the Dreggs of the Blood in adult living Creatures, oftentimes by the Inteſtines as a Sink; the unneceſſary being carryed away by diſgeſtion and by other wayes: and in the mean time the Veins receive a certain portion of the Chyle, and preſently mix it with the Blood.

The uſe of them inquired into.

Of the thick Inteſtines.

There will be no great need to ſpeak here much of the thick Inteſtines, as to what appertains to evacuation, becauſe that the Virtue of Medicines taken in at the Mouth is almoſt exhauſted, before they can come into theſe Inwards, ſo that the irritation of theſe ariſe partly by a conſent of the ſuperior Inteſtines, and partly by their contents being violently diſturbed, rather then from the Medicine

cine it self. They have the same Coats as the small Guts; and as the *fæces* ascend strait into the *Colon*, there is need of more strong fleshy Fibres, which make a strong motion of contraction. Hence if there be an Inflammation or *Sphaceliſimus* (as I have often known,) about the beginning of the *Colon*, so that the fleshy Fibres being hurt that they are not able to make the Contractions to lift the *fæces* upwards, they flowing back towards the *Ileon*, do cause the incurable Iliack Passion. Moreover in this Intestine those champered coverings or Caverns are added, that the *fæces* being the longer detained in the Belly, the trouble of often letting them forth may be taken away. The Evacuation belonging to this Region, consists chiefly in Clysters. In some the interior Coat of the *Colon* is so very tender and sensible, that by reason of a Clyster injected, although to ease Pains, presently the Spirits growing hot, and being thrust forth among the nervous Fibres, they hugely put up the membranes, and distend them, so that they excite great trouble through the whole *Abdomen*. What we have now delivered concerning the Excretory motions of the Inwards, depending upon the contractions of the fleshy Fibres, will be better manifested, if our Hypothesis be consulted of the fashion and motion of the Muscle not long since published. As for the rest, for the more clear illustrating of the Anatomie of these parts, we have taken care to add here the Figures of each of them most exactly, and to the Life delineated by a most skilful Artist, and although in the description of the Ventricle with the *Oesophagus* and Intestines, we have followed *Fallopius* and others both Ancient and Modern, and have assigned to every one of them only three Coats; yet by the separation of these (after their being immersed in hot Water) being a little more accurately made four distinctly appeared. For the hairy Crust, which some have esteemed only an addition to the nervous Coat, is a peculiar Membrane, thick enough of it self, and for the innumerable little Glandulas with which its exterior superficies abounds, may be properly called the Glandulous Coat, as may manifestly appear by the Figures.

Part I.

The Iliack passion often comes by the Inflammation of the Colon.

THE

THE EXPLICATION OF THE FIGURES.

The first Table represents the Ventricle of a Man with its Vessels strutting with Blood, enptied, and blown up that all the Arteries and Veins with their Ramifications (which are truly and most exactly delineated) may be seen.

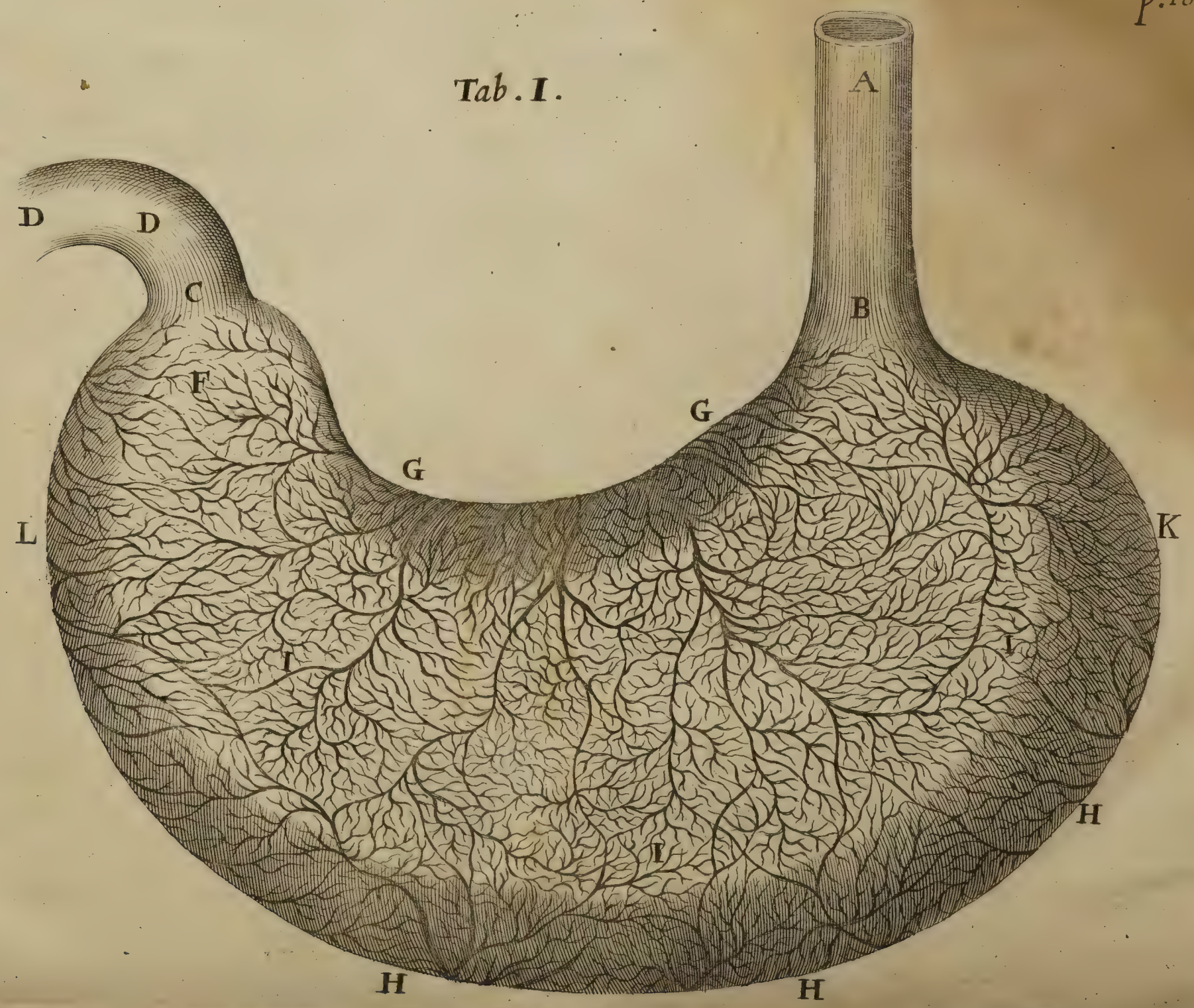
A *The* Oesophagus.
B *The Mouth of the Ventricle, nigh to which the motricious upper oblique Fibres, for the sudden opening and shutting of it, appear streight.*
C *The Orifice of the* Pylorus *with the* Duodenum *hanging to it.*
D D *A Portion of the* Duodenum *whose fleshy Fibres more thick in that place, appear under the outmost Coat.*
F F *To* C: *The Den of the* Pylorus.
G G *The top of the Ventricle, where the sanguiferous Vessels being inserted, do flow downwards, and disperse on all sides their Branches and Shoots.*
H H *The bottom of the Ventricle in which the sanguiferous Vessels ascending upwards are inserted, and disperse most thickly on all sides their little Branches and Shoots.*
I I I *The mutual Embracings and wonderful communications of the Vessels of either insertion.*
K L *The right end and left of the Stomach.*

The second Table expresses altogether the outmost nervous Coat of the humane Ventricle, whose nervous Fibres being carried the length of it, do cut the underlying exterior fleshy Fibres almost in right Angles.

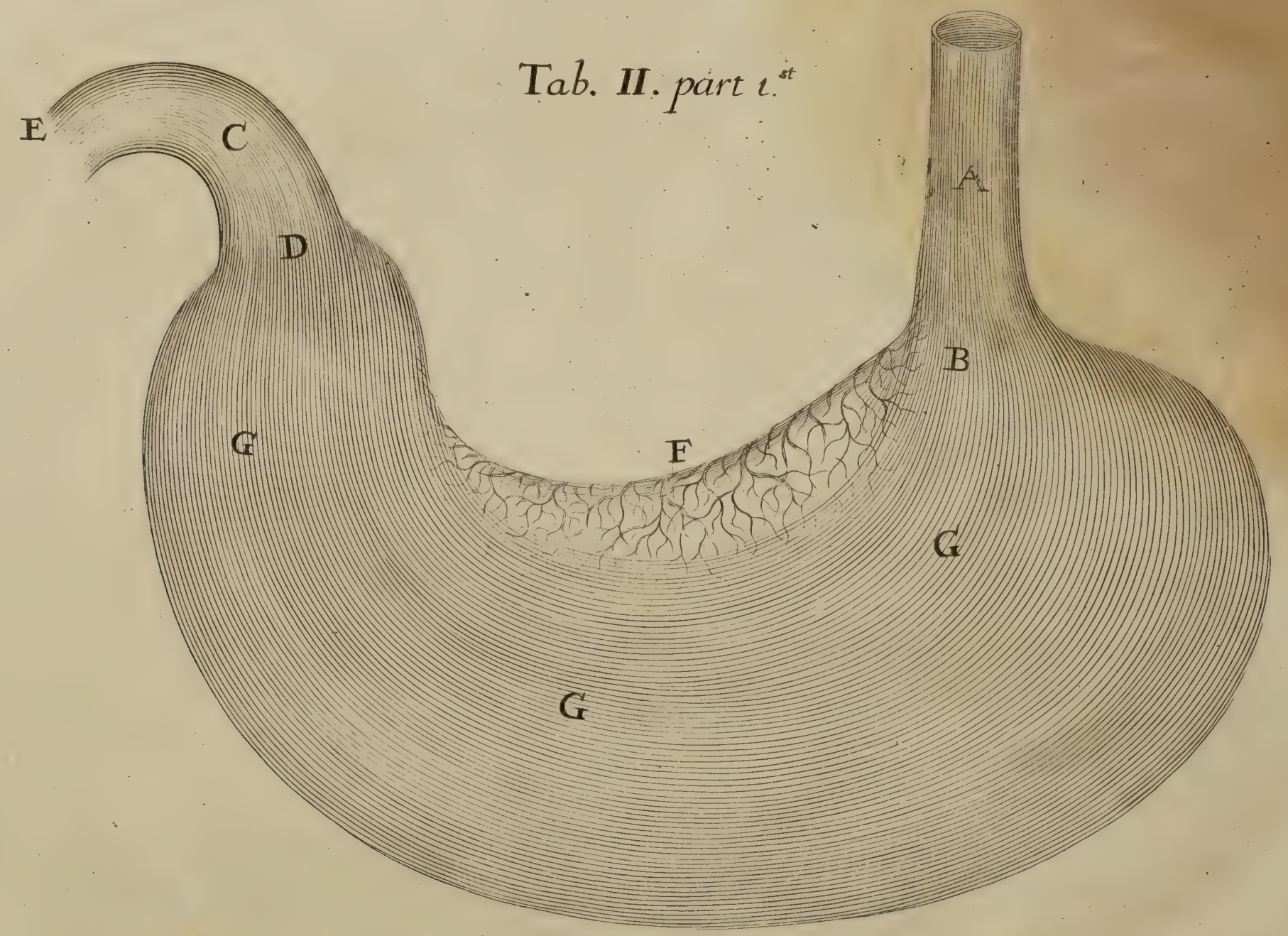
A *The* Oesophagus *in whose exterior Coat all the nervous Fibres descend in a right Line cutting the underlying fleshy fibres obliquely.*
B *The Mouth of the Ventricle.*
C *The* Pylorus; *with its Den.*
E *A part of the* Duodenum *thereto hanging.*
F *The top of the Ventricle, where the blood-carrying Vessels appear thickly planted.*
G G G *The slender and nervous Fibres stretched the whole length of the Stomach from one Orifice to the other, and beyond either.*

The third Table exhibits the humane Ventricle naked without its outward nervous Coat, that the exterior or Convex superficies of the middle Coat with its fleshy Fibres may appear.

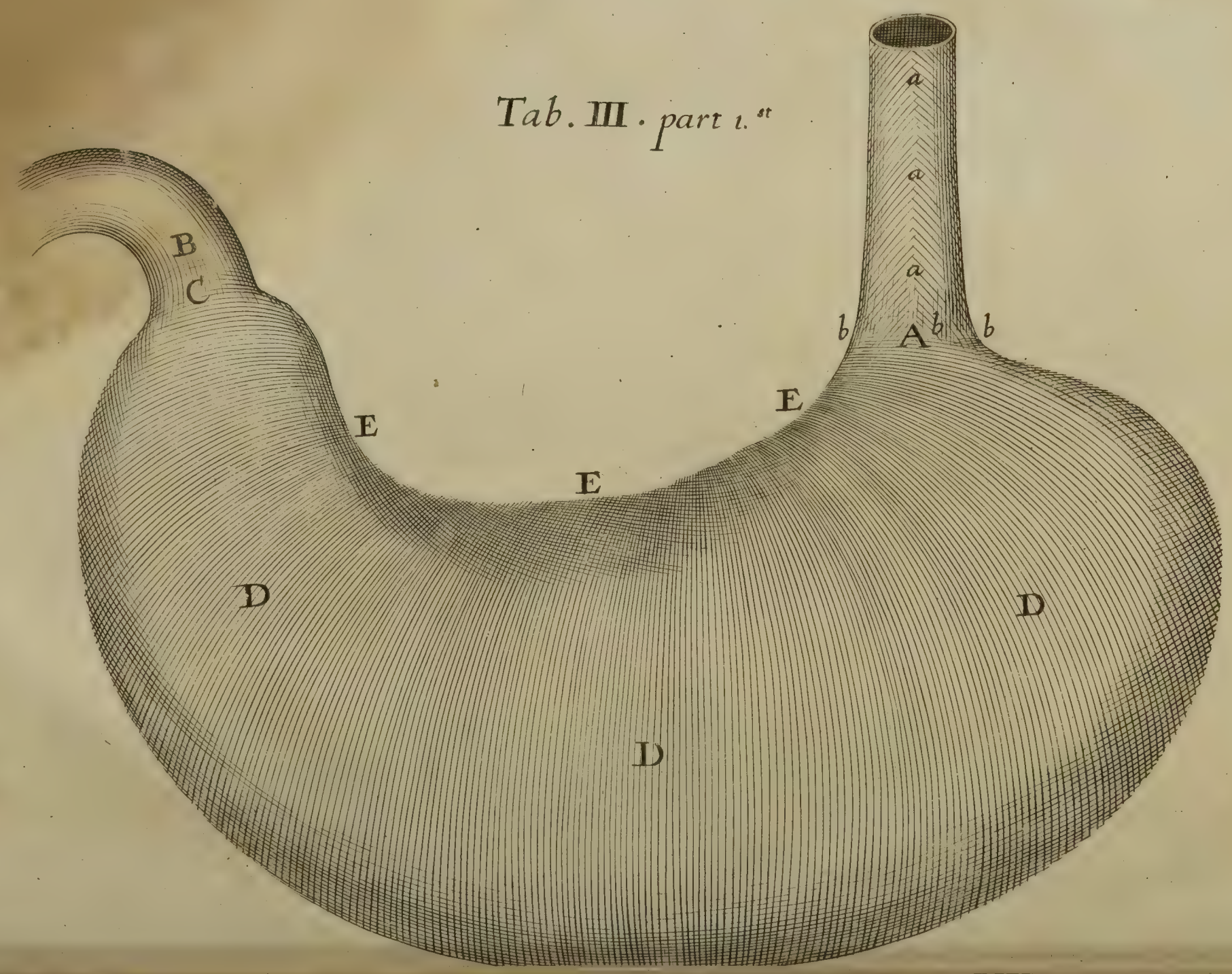
Tab. I.



Tab. II. part 1.st

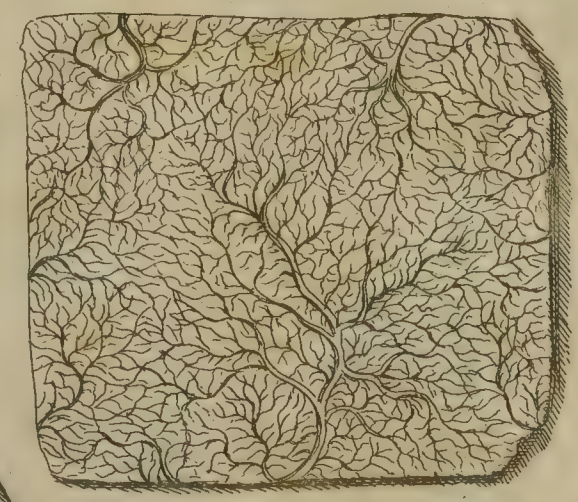


Tab. III. part 1.st



Tab. IV. *part 1st*

Fig. 2.



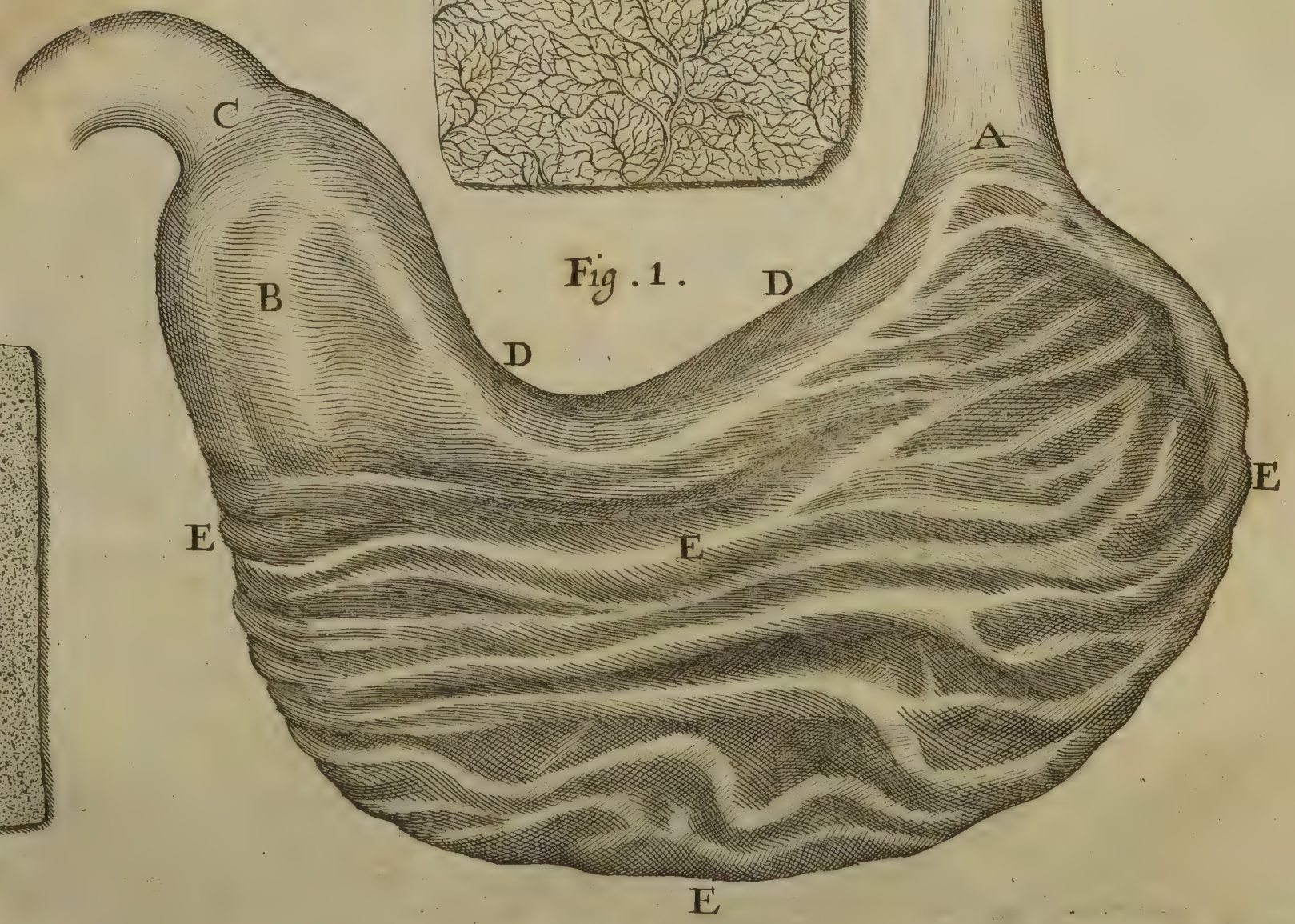
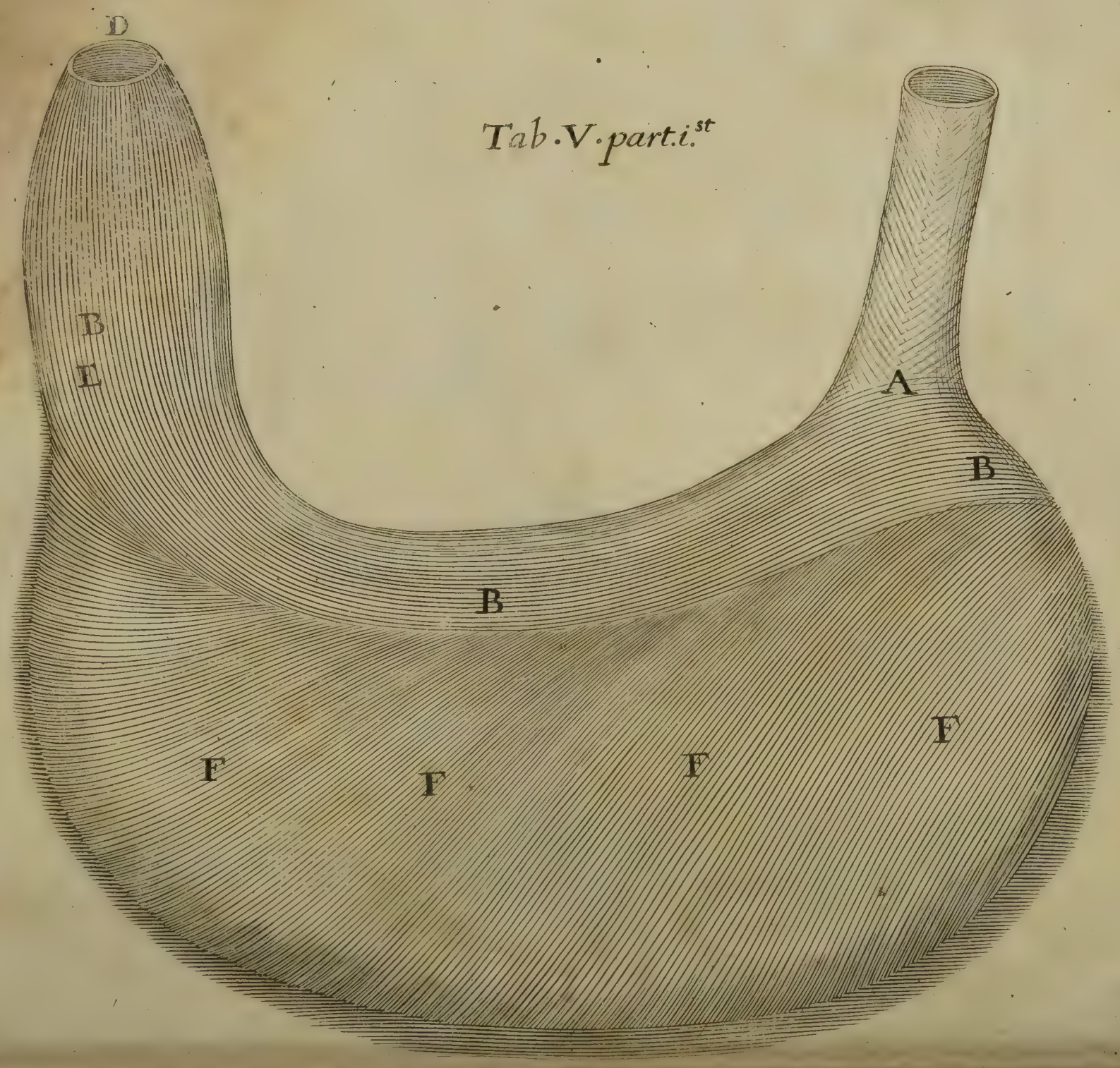


Fig. 1.

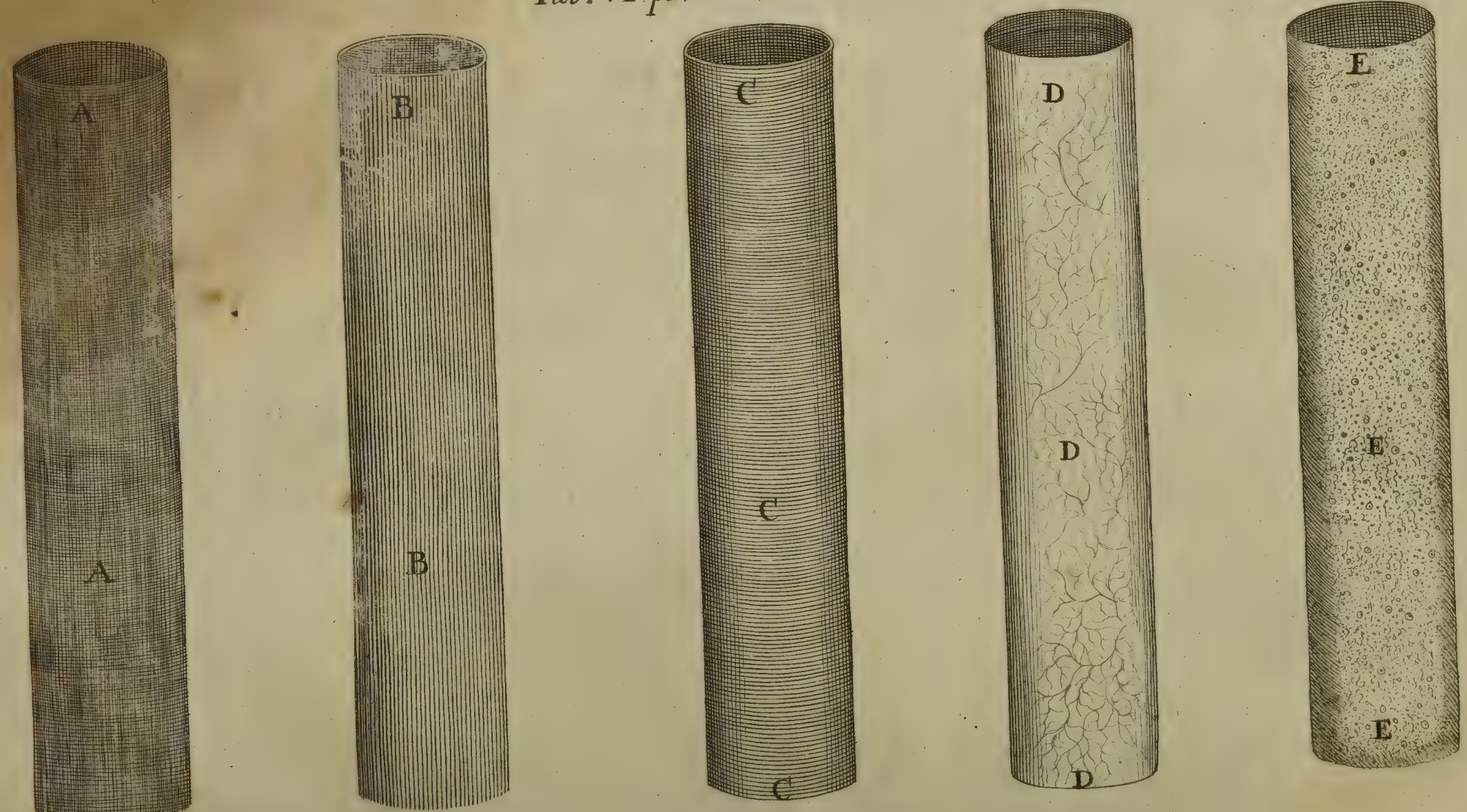
Fig. 3.



Tab. V. part. i.st



Tab. VI *part.ts*



A *The Mouth of the Ventricle, to which the* Oesophagus a a a *is joyned, and which the fleshie circular Fibres* b b b *do compass about, and as occasion serves being contracted, do shut up.*
B *The* Pylorus *with the* Duodenum *thereto hanging.*
C *The Orifice, and Den of the* Pylorus, *either of which the circular Fibres, whilst they are contracted do straiten, and (as you may see) shut up.*
D D D *The circular Fibres compassing about the Ventricle in its depth or Profundity.*
E E E *The Top or height of the Ventricle where those Fibres arise, whilst they are contracted upwards towards it, they cause the whole joyning of the Stomach to be very much streitned.*

The Fourth Table whose first Figure shews the Ventricle turned inside out, with the interior and concave Superficies changed into the exterior and convex, that the hairy Crust, with its Wrinkles and Folds covering the Stomach, may be seen.

A *The left Orifice, or the Mouth of the Ventricle.*
B *The Den of the* Pylorus *in which the thicker Coats exist.*
C *Its Orifice to which the* Duodenum *is knit.*
D D *The top of the Ventricle, or height between the Orifices.*
E E E E *The sides, end, and bottom of it in which the hairy Crust of the interior Coat and the Wrinkles and Furrows in it are expressed to the Life.*

The Second Figure represents a Portion of the nervous Coat in which the hairy Crust being taken away, the interior or concave superficies, with the most thick Ramification of the Vessels appears.

The Third Figure shews a Portion of the hairy Coat, or glandulous, in which its exterior superficies whereby it sticks to the nervous Coat repleniſhed with glandulas and little Mouths of the Vessels, is beheld.

The Fifth Table shews the interior superficies of the fleshy Coat, and the concave inverted or turned outwards that one of the Series of the moving Fibres may be seen.

A *The Mouth of the Ventricle, near to which the series of Fibres is seen to arise, partly forward in straight Lines, and partly carried in oblique Lines.*
B B B *A manifest company of Fibres, which compassing about the mouth of the Ventricle run along its top to the* Pylorus, *and covering the length of its Den do terminate in its Orifice.*
D *The Orifice of the* Pylorus.
E *The Den of the* Pylorus.
F F F F *Other fleshy Fibres, which tending obliquely from the left side of the Stomach towards its right, descend down to its Bottom.*

The Sixth Table represents all the Coats of the small Guts separated one from another, that the nervous Fibres with the Glandulas and Ramifications of the Vessels, also the orders of the moving Fibres may be clearly and distinctly observed.

A A *Exhibits the outmost Superficies of the whole Intestine whose most slender nervous Coat with its most slender nervous Fibres round it, as may be seen, appears stretched out.*
B B *The exterior superficies of the fleshy or middle Coat, which, the others being taken away, with the Series or its order of longitudinal moving Fibres is plainly seen.*

Part I.

CCC *The annularie or circular Fibres of the ſame Coat, which, the firſt Series or order being taken away, manifeſtly appear.*

DD *The interior nervous Coat, whoſe interior Superficies, the hairy Cruſt being taken away with its thick ramification of Veſſells, is expoſed to ſight.*

EEE *The exterior or convex ſuperficies of the hairy or glandulous Coat, by which it ſticks to the nervous Coat, with the glandulaes and moſt thickly planted little Mouths of Veſſels, is ſhown.*

SECT. II.

SECT. II.

CHAP. I.

Of Vomiting and of Vomitory Medicines.

HAving after this manner laid forth the Stage for medicinal Action, or at leaſt briefly ſhadowed forth its firſt Circle, it now is incumbent upon us to deſcribe the ſeveral kinds of medicinal Operations, the reaſons of them, and the ways of their Affecting. Therefore we will inquire from the beginning what is acted in the firſt *Stadium*, to wit, in the Ventricle, and how vomitory Medicines do work. Where in the firſt place it behoves us to explain, what kind of Affection Vomiting is, alſo for what cauſe, and upon what occaſions, either according or beſides Nature it is wont to be excited. Then in the ſecond place ſhall be ſhown upon what Parts, or Spirits inhabiting them, or the watry Humours, and after what manner Medicines, while they provoke to Vomit, do operate,

How the Ventricle and Oeſophagus *are affected in Vomiting.*

As to the firſt, when any one is affected with Vomiting, he may perceive in himſelf the Bottom of the Ventricle to be drawn upward, and the upper Orifice to be opened, and in the mean time (as it ſeems) the *Pylorus* being ſhut faſt, or drawn inward, by an inverſed motion at the ſame time the whole Pipe of the *Oeſophagus*, to wit, from the Bottom to the Top, to endeavour as it were with a certain kind of pumping, that what is therein contained may be thruſt up higher, and at laſt caſt forth at the Mouth. Theſe kinds of motions of theſe parts, are made without doubt by the fleſhy Fibres which compoſe the middle Coat of the Ventricle. For we may perceive in this Coat, two diſtinct Orders of fleſhy or motional Fibres, which compaſs about the Stomach thorow its whole dimenſions, and being together contracted, they gather cloſe its Bottom and Sides, draw them upwards, and incline them either towards this or that Orifice; for that the Contents may be caſt forth at the door, ſometimes at this, ſometimes at that. As to the interior Fibres, which determine the contractions of all the reſt either to this or to that Evacuation, if there be any where made about the Bottom or Sides of the Stomach, a gentle irritation, the Convulſion begins towards the *Pylorus*, and the internal moving Fibres are at their right Ends firſt and ſooneſt contracted, the whole joyning of the ventricle being there contracted, it pours forth its loding into the Inteſtines: but if the irritation be vehement, and very provoking in any part of the Stomach excited, it will not be eaſily reſtrained or transferred towards the Inteſtines, the Convulſion beginning towards the left ends of the interior Fibres, and leading towards the Mouth of the Ventricle, it makes there the whole Capacity of the Stomach being extremely ſtraitned and contracted, to be drawn up together; ſo that the *Pylorus* being drawn inwards and ſhut faſt, and the Mouth of the Ventricle open, what ever is therein contained, is caſt out upwards.

By what fleſhy Fibres the Emetick Convulſion is performed.

The ſame fleſhy Fibres, as the animal Spirits variouſly ſtirred up do leap forth out of theſe or thoſe Tendons firſt, in the right or left ends of them, there they begin their Convulſions, and are determined to provoke to Stool or to Vomit reſpectively. Moreover whilſt that the Ventricle is diſpoſed after the aforeſaid manner to the upper egeſtion, the *Oeſophagus* conſpires alſo in the action for the caſting forth its Contents upwards. And for as much as we have noted in the fleſhy Coat two double orders of moving Fibres, of which one of them aſcending obliquely, the other deſcending, they all mutually do cut one another; the Office of the former ſeems to be, that they in ſtraining to Vomit being one ſeries after another contracted, may ſhut up the

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Vomiting or a Convulsive motion.

Throat behind for the casting forth of its Balast, and so cause it to be forced to that gaping of the Mouth.

Vomiting therefore, for as much as it is a violent motion of the Stomach, and very often involuntary, it is not undeservedly called Convulsive; which further we do affirm to proceed from the Explosion, or a certain great Expansion (according to our Spasmologie deliver'd in another place) of the animal Spirits, which possess these fleshy Fibres. For truly these Spirits being highly irritated and then presently bursting forth, they first of all rush impetuously from the Tendons planted near the left Orifice, and then presently out of others into the fleshy Fibres, and highly inflate and abbreviate them, so that the whole parts of that Coat being brought nigh together one after another, the whole Cavitie of the Stomach being straitned, and folded together, and so contracted upwards towards the left Orifice, it drives forward or more upward as it were with the stroke of a Bolt, whatsoever is therein contained, that it may be bolted forth by Vomiting.

How Vomiting differs from other Convulsions.

In most of the other kinds of Convulsions, the convulsive motion is wont to be made towards the same limit as the natural: but Vomiting seems to be an affection contrary or at least opposite to the ordinary and natural Action of the Stomach. For it is its solemn and almost constant gesture, the whole or its parts, to be drawn downwards, or towards the *Pylorus*: for there is need of such a motion and of its tendencie, whereby the aliment swallowed down may be able to descend into the bottom of the Ventricle and there to be more straitly pressed, to be rolled from side to side, to be digested into Chyle, and at length to be transmitted to the Intestines. Therefore for these uses the moving Fibres of either order being inflated by the gentle incursion of the Spirits they easily compose the Ventricle after that manner which the instinct of Nature suggests.

But if any Irritation happens to the nervous Fibres of the Stomach, whilst the hurt is but small and easily removed, the expulsive Contraction is begun rather towards the *Pylorus* than towards the Throat: but in Vomiting the Convulsion of the moving fibres beginning at the other ends of them, *viz.* the left ends, and straitways becoming violent and impetuous compells the whole Cavity of the Stomach collected together, and greatly straitned, to be drawn up, and to be evacuated that way. The reason of which is, that if there be any thing very troublesom and disagreeing to Nature setled in the Stomach, it ought not be carried about the ordinary way, by the long *ambages* of the Intestines, that it might be at last expelled at the Fundament; but to be cast out by a more near *exit*, and that out of hand to be sifted out, lest by its stay it might cause an incurable disease. Besides, when very great grief happens in other parts at a distance from the Ventricle, lest that, whilst Nature is busied about them, the Stomach (where is the first Enkindling of Life) should receive any hurt, oftentimes for its greater safety Vomiting is excited by a consent. So that it is provided by the deep providence of the Divine *Architect* for the more certain custody of the humane Body as it were a Tower, as often as as an external Enemie shall invade, or that a sedition shall arise among the proper Inhabitants, forthwith, whatsoever Guests, as persons suspected, are cast forth at the neareſt Passage, to wit, the Gate of the Ventricle.

The Conjunct cause of Vomiting.

Therefore the next or conjunct cause of Vomiting is a sudden and vehement Explosion of the animal Spirits seated in the fleshy Coat of the Ventricle, by which indeed they are very much irritated, and then expansed, and rarefied, as they leap impetuously from all the tendinous Fibres, and then first and chiefly from those that are placed near the Mouth of the Ventricle, into the fleshy Fibres, so that they suddenly blow them up, and abbreviate them, wherefore as the Sides and Bottom of the Stomach being of course brought near together, and all together snatch'd upwards towards the left Orifice, they cast forth what ever is contained therein to the Pipe of the *Oesophagus*; from whence (when as its contraction from the Bottom to the Top immediatly follows) it is caried forth at the gapind of the Mouth.

By what reason the Spirits are stirred up in Emetic Convulsions.

These sorts of Spirits begin the emetick Explosions, because they are highly irritated: but after what manner that is done we have shown in our Tract of convulsive Affections; for that they being highly endued with an Elastick Nature, from a certain ὁρμὴν, yea sometimes they leap forth of their own accord by reason of some heterogeneous joyning together, and impetuously fling themselves forth

forth on all ſides. But for what cauſes and by what means it happens that they are ſo irritated, we ſhall inquire anon. In the mean time it may be obſerved that the Spirits inhabiting the Fibres of the Stomach do exiſt in ſome more thick and firm, that they are not, unleſs by a more ſtrong irritation, agitated into an emetick Exploſion; but in others they are either more ſubtil, or too much elaſtick, that from a light occaſion they are incited to a vomitive Convulſion. Moreover when any thing hurtful or moleſting afflicts the fleſhy Fibres of the Stomach, a Convulſion is excited in theſe towards the *Pylorus*, in others it is more readily carried towards the Mouth of the Ventricle, and from thence either Vomiting or Purging proceeds. Part I.

As to what appertains to the more remote cauſes of Vomiting, of which number are whatſoever do much or grievouſly irritate the Spirits ſeated in the fleſhy Fibres of the Stomach: which truly happens to be done after very many ways, we ſhall reduce them to ſome certain Heads. And in the firſt place may be referred hither improportionate objects approaching the interior and nervous Coat of the Ventricle or rather the Spirits inhabiting it; for this being hauled, oftentimes provokes the other lying over it into emetick Convulſions. Theſe Provocatives are either taken in at the Mouth, to wit, diſagreeing Food, Medicines, or Poyſons, or elſe a Matter begotten in the Ventricle, or laſtly brought thither from afar by the Arteries and the Nerves; or in the ſecond place the Spirits inhabiting the fleſhy Fibres of the Stomach are irritated by reaſon of ſome trouble from other Spirits at a diſtance inflicted here or there, and communicated from thence to the Ventricle by the Pipes of the Fibres or Nerves. Vomiting excited after the former manner, may be called the proper affection of the Ventricle, and this latter to be done by conſent. We ſhall note ſome Inſtances of all of theſe. *The more remote cauſes of Vomiting.*

In the firſt place therefore an irritation made in the interior Tunicle, of the Ventricle provokes Vomiting before any other cauſe whatſoever. For this part being nervous and very ſenſible of impreſſions from all things conteined in the Stomach and according as theſe are either pleaſant or grievous, the fleſhy overlying Coat is ſtirred up to the motion of embracing or caſting off; and as to the latter of theſe, as the improportionate object is more or leſs troubleſom to Nature, either Vomiting or Purging is ſtirred up. Further in this Coat of the Stomach there ſeems to be placed ſome peculiar ſenſibleneſs, both as to the touch and to the taſte diſtinct from any other thing in the whole Body, For truly when Medicines, or ſome Aliments, as *Stibium*, *Mercurius Vitæ*, the Flowers of Antimony, the Spawn of the Barbel, with many others being chewed in the Mouth, they have cauſed no trouble to the Senſe, but theſe being ſunk down into the Stomach, how cruelly do they irritate this Coat, and quickly ſtir up moſt grievous Convulſions. Moreover if any one ſhould ſwallow down, though unknown, a ſmall portion of diſagreeing Aliment by Antipathy, though it be never ſo ſmall, cover'd over with other Meats, and hid as it were with a Mask, it is known by the Stomach, and as if he were an Enemy entred clandeſtinly, he is immediatly by an excited force caſt out of doors. The emetick provocatives taken in at the Mouth are either Medicins, the reaſons of whoſe actings ſhall be given hereafter, or Poyſons, which produce that effect, for as much as they being of an infeſtous nature, do at the firſt touch overthrow the Stomachal Spirits, and bring them as it were into a Furie, or in the third place Aliments of which there is enough commonly known, for if they offend in a manifeſt or occult quantity, or in quality, or in the manner of taking them, or are improportionate to the Stomach, they for that cauſe do not rarely ſtir up Vomiting. *Vomiting in reſpect of the Ventricle is either Idiopathick or Sympathick. The former proceeds from the irritation of its nervous Coat.* *The emetick Irritation.* *The emetick Matter.* *1. Either taken in at the Mouth.*

Secondly, the emetick Matter is ſometimes begotten in the Ventricle; to wit, when the things taken in are not in fault; and when the Chyle or fermentative Juice of the Ventricle degenerates into a ſharp, auſtere, or bitter, or otherways infeſtous Humour, and for that cauſe irritative, as it very often happens in Cholerick and Hypochondriack perſons. *2. Or begotten in the Ventricle.*

Thirdly, nor is this provocative Humour leſs frequently poured into the Ventricle, from another place: for beſides that Choler, and (as ſome are of opinion) the pancreatick Juice, ſometimes ſingly, and ſometimes together, being emptied into the Stomach, mutually ſtriving and boyling up do provoke its Fibres into vomitive Convulſions, there is moreover an heterogeneous Matter tranſlated hither by the Arteries, which oftentimes ſtirs up very great Vomitings; ſo it very often *3. Or is poured in thither from a nother place.*

Part 1. often happens in the Paroxyſms and Criſes of Fevers, and eſpecially in the Plague, and ſmall Pox. Sometimes the ſanguineous maſs boyling up, not being indeed able to expell its ſuperfluities by the διαπνοὴν or Perſpiration, it pours it forth by the branches of the Cœliack Arterie, and by the cavities of the Ventricle and Inteſtines; ſo that their Coats being notably hauled they ſuffer horrid Vomitings, and alſo dyſenterick Paſſions; alſo the Vomitive matter ſeems not only to deſcend by the Arteries but ſometimes alſo by the Nerves. Hence very often the Colick ariſes as we have clearly enough ſhown: But truly I have obſerved in many (who have been obnoxious to convulſive Paſſions) after a ſhort Headach, with heavineſs, and Vertigo, that a vomiting affection hath followed: that they returned back by Vomit what they have daily taken in, without any notable impurity of the Stomach. The matter ſo poured forth by the Arteries or Nerves upon the Coat of the Stomach, ſo it be looſe and eaſily to be diſſipated, is quickly ſhaken off again, ſo that the Affection ſoon paſſes away, but if it be more fixed and adhering more pertinaciouſly to them, yea ſometimes growing into Humours of various kinds it induces a daily vomiting diſpoſition, and not eaſily curable.

Sympathetick Vomiting or by conſent.

So much of Vomiting, whoſe material or irritative cauſe being placed ſomewhere about the internal ſuperficies of the Stomach, and affecting the nervous Fibres by a naked touch, ſtirs up the Spirits inhabiting in the fleſhy Fibres into emetick Exploſions. There remain very many other ſpecies of Vomiting, in which an irritation is made in other places, and preſently the Stomach is ſtirred up to Convulſions by conſent: For indeed as there is ſo much alliance, and mutual dependency between this Inward and moſt of the other parts, it often happens, by reaſon of ſome of the animal Spirits ſomewhere very greatly diſturbed, that by and by the other Spirits that reſide in the Ventricle, either by the continuity of the Fibres, or by the paſſage of the Nerves, come to be in like manner affected, and to be driven into vomitive Exploſions.

By the conſent of what parts it is ſtirred up.

The places of this ſort of Sympathetick Vomiting are either more near, to wit, both the Orifices of the Stomach with the *Duodenum* and the *Oeſophagus*, or more remote, *viz.* the ἐγκέφαλος, and *meninges* (or thin Skins about the Brain and Heart) as alſo the Spleen, the Reins, the Ureters, Meſenterie, the Matrix, and perhaps other Inwards of the *Abdomen*; in one of which, or many of them together there being excited a Convulſion, and from thence communicated to the Stomach by the Pipes of the Nerves, it ſtirs up its fleſhy Fibres into emetick Contractions. In like manner when the animal Spirits in the Head are very much diſturbed, their diſorder by and by doth effect by conſent thoſe other inhabiting the Ventricle, and ſtirs them up into the like Convulſions or ἀταξίας: we will note ſome inſtances of each of theſe, with the reaſons of them.

2. Either Oriſice being affected.

In the firſt place either of the Orifices or doors of the Stomach, as they are very ſenſible by reaſon of the manifold Inſertions of the Nerves, they are eaſily irritated; and for that cauſe being brought ſometimes inwardly ſometimes outwardly, and variouſly expanſed, or ſhut up, they excite excretory Convulſions in the whole Ventricle, tending either upwards or downwards. There is nothing almoſt in it ſelf but that that it is ſenſible of, and the acid or bitter Humours fluctuating in the Stomach, and biting the left Orifice do provoke a Nauſeouſneſs and Vomiting. No leſs is the ſame effect produced by the flowing of the *Bile* into the *Pylorus*.

Vomiting from the Pylorus *being affected.*

It would be too much from the purpoſe to relate the Dreams of *Helmont* of the dignity and dominion of theſe parts; he affirms the left Orifice to be the Seat of the Soul, and the right, to wit, the *Pylorus*, of the Appetite, and to be the ſhop of the other Paſſions merely natural; beſides from its indignation, and obſtinate ſhutting up, horrid Vomitings to proceed. Although we do not at all aſſent to theſe; yet by reaſon of this Door's being too much ſhut up, that Vomiting and other evil affections of the Stomach do ariſe, the following Hiſtories will declare.

An anatomick Obſervation of this.

An illuſtrious young man, being a long while Cachectical, and labouring with often Vomiting, and that dayly for many Months and almoſt continually, at laſt his ſtrength being quite worn out he dyed. The Carccaſe being opened I found the *Pylorus* full of *Scirrhi* very tender, and ſenſible Pimples, round about, which had almoſt ſhut up its Mouth; ſo that the Chyle geting between the ſpace of the Nodes, did extreamly putrefie, and for that cauſe the whole Inward was almoſt

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moſt continually affected with a moſt troubleſome Senſe, and Convulſion. No leſs will a very rare caſe of a certain Man of *Oxford* ſhew, an almoſt perpetual Vomiting to be ſtirred up by the ſhutting up of the left Orifice. A ſtrong Man, and otherwiſe healthful enough, labouring for a long time with often Vomiting, he was wont, very often, though not allways, preſently to caſt up whatſoever he had eaten. At length the Diſeaſe having overcome all remedies, he was brought into that condition, that growing hungry he would eat until the *Oeſophagus* was filled up to the Throat, in the mean time nothing ſliding down into the Ventricle, he caſt up raw (or crude) whatſoever he had taken in: when that no Medicines could help, and he languiſhed away for hunger, and every Day was in danger of Death, I prepared an Inſtrument for him like a Rod, of a whale Bone, with a little round Button of Spunge fixed to the top of it; the ſick Man having taken down meat and drink into his Throat, preſently putting this down in the *Oeſophagus*, he did thruſt down into the Ventricle, its Orifice being opened, the Food which otherwiſe would come back again; and by this means he hath daily taken his ſuſtenance for ſixteen Years and doth yet uſe the ſame Machine, and is yet alive, and well, who would otherwiſe periſh for want of Food. Without doubt in this caſe the Mouth of the Stomach being always cloſed, either by a Tumour or Palſie, nothing could be admitted into the Ventricle unleſs it were violently opened.

Vomiting from the Mouth of the Ventricle being affected.

A notable caſe of this.

Vomiting.

No leſs frequently a Convulſion being excited, by reaſon of Irritations above this left Orifice, and below the *Pylorus* in its neighbouring parts, and propagated by the continuity of the Fibres into the Ventricle, it there ſtirs up emetick contractions. When in the ſwallowing down of Food by the Pipe of the *Oeſophagus*, it ſticks by reaſon of a Palſie or Obſtruction, and ſtimulates the nervous Fibres, preſently the fleſhy Fibres being contracted upwards they alſo by a conſent force the Ventricle into a Convulſion. The like effect at all times happens from the Palate and *Uvula's* beeing irritated. Hence very often an endeavour to Vomit, or vomiting is ſtirred up, from ingrateful Meat or Drink, allmoſt as ſoon as taſted in the Mouth, alſo by a feather put down the Throat. For the ſame reaſon alſo in the Pthiſick ſometimes a Vomiting accompanies, or follows the vehement Cough; to wit, throw the hauling or concuſſion of the ſame Coat, which in like manner covers the Throat, and the top of the wind-pipe. In like manner in the lower appendix of the Ventricle, *viz.* in the Inteſtines, if that any trouble happens any where with a Convulſion, oftentimes that affection, by the Continuitie of the Fibres creeping upwards, provokes Vomiting. For this reaſon Vomiting is excited in the Cholerick Diſeaſe, Iliack Paſſion and other Torments of the Inteſtines. Hence alſo ſome whoſe *Viſcera* are very tender in taking of a Gliſter conſtantly Vomit. It were eaſie, to heap up very many Inſtances of this kind, but we will paſs on to other cauſes of Vomiting.

The Sympathic cauſe of Vomiting in the Oeſophagus.

Alſo below the Ventricle in the Bowels.

3. Beſides theſe now mentioned ways in which an irritation is made in the Ventricle it ſelf, or in its appendix, it ſometimes happens that the Stomach, guiltleſs and well enough of it ſelf, ſuffers through default of other parts ſeated at a great diſtance; which is not done by the great continuity of Fibres, but by the Paſſage or Commerce of the Nerves. For truly by the leading Pipe of theſe, when that the Animal Spirits are diſturbed in one place, others dwelling afar off they receive the like irritations and fall into contractions: hence from a wound or grievous blow upon the Head, for as much as the Spirits within the *Encephalon* being diſturbed; by the paſſage of the eighth pair of Nerves, they ſtir up the others reſiding in the Ventricle into the Convulſions, Vomiting frequently follows: for the ſame reaſon, ſome being in a Ship, or riding in a Coach are troubled with huge Vomiting. The cauſe of which Sickneſs is not by any means (as ſome affirm) the agitation of the Humours; but truly the Animal Spirits inhabiting the Brain, being compelled into inordinate motions, they fall tumultuouſly upon the beginning of the Nerves, and by their leading Pipe ſtir up the emetick contractions of the Inwards. In the mean time the Matter caſt out by Vomiting, is mere choler, which is by reaſon of the former Convulſion powred forth by the Choler-carrying Veſſels; ſo far is it that it ſhould be the primary cauſe of Vomiting. Further when that the Stemms out of the Trunk of the ſame eighth pair of Nerves and the inferior Branches, diſturbed in the peculiar Inwards of the *Abdomen* are irritated into Convulſions, other Stemms however untouched do not unfrequently receive the like diſturbance, and they themſelves impart to the

The cauſe of Vomiting ſometimes in the Head.

In the remote parts of the Abdomen.

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the other Inwards. and chiefly to the Ventricle, convulsive Motions. This of Vomiting is manifest for that it is stirred up in Nephritick Paroxysms, also in the Passions of the Colick, and hysterick Affections so called.

Thus far of Vomiting in general, and of its subject, formal reason, causes and various manners of doing it, in which hath been shown, that this affection is altogether stirred up by the Spirits inhabiting the fleshy Coat of the Ventricle being highly provoked, and drawn by their acting into convulsive Explosions, and they for the most part and chiefly into that sort of contractive Motions, by reason of the troublesom sense impressed on the interior nervous Coat; besides that those irregularities of the Spirits so affected, by reason of the Spirits being disturbed in other places, do communicate by the continuity of the Fibres, or the Pipe of the Nerves, their disorder to the Ventricle. These things being premised, it remains next that (as it was in the second place proposed) treating of vomitive Medicines, we do shew by what manner and by what sort of strife they operate in the Ventricle, and other parts of our Body.

How the emetick Medicines do operate.

Concerning these it is very obvious to conceive, that Vomits being taken in at the Mouth, and received into the Ventricle, do at the first irritate its interior nervous Coat, and press on it a sense of the trouble, and afterwards by the instigation of this the over-lying fleshy Coat is affected, and stirred up to excretory contractions for the casting off this Grief. But truly as to the manner of irritation and the ways of excretion, there are some differences, and the reasons of them are not very manifest.

For first of all when that cathartick Medicines, being taken into the Stomach do provoke its fleshy Fibres into exterior contractions, from whence comes it, that from these more often and rather Vomiting is stirred up, and from those purging, not indifferently either?

2. Further concerning those which for the most part and allmost constantly move Vomiting it is to be observed, a certain Energie either in the manifest reason of its working, to produce that effect, as when that which is taken is truly ingrateful in taste, in smell, or any other sensible quality, or that they offend in quantity; and moreover some Medicines, to be given, being more properly and specifically disposed for Vomits, the emetick Virtue of which is altogether hid from our senses, only it betrays it self by manifest effects in the Stomach. The solutions of these will make very much to the well building up of Emetologie.

Vomitory Medicines from cathartick differ, are either.

1. As to the first, that such a Medicine should rather operate by Vomit, than by Stool, that ought to consist in the particles of it, which, as they are deadly or at least disagreeing to Nature, besides that they may be so as to the quality, or quantity, that neither may indeed be overcome by the Stomach; neither may they be able to be suffered by it so long until being scoured off by little and little from the Fibres or little Strings, and together with other Juices leasurely and by Parts be cast out by the *Pylorus*. But truly because they either do more severely haul the Fibres of the Ventricle, or adhere more pertinaciously to them, or do aggravate it by their motion, and distend it, presently the fleshy Fibres prepare for excretory Convulsions, and then by the instinct of Nature, they are rather contracted after that manner, by which they may send forth a doors that which troubles them with the greater force, and by the shortest *Exit*. How the fleshy Fibres are moved in order to Purging, we shall declare hereafter.

Emeticks which are either gentler or stronger.

2. As to what respects the distinction of Emeticks, and the divers reasons of their working, they are commonly understood to be twofold, *viz.* more gentle and more strong; the former of which do bring into open view their emetick Force, and bring forth their irritative Power by manifest Marks: as when the Decoction of Hyssop or Carduus, or the infusion of Sea Onyon or Radish Roots, or a solution of Vitriol, warm Water or honied Wine or such like be plentifully drank; which even at first sight move the Stomach with the taste, they are forced to a striving to Vomit: those being exhibited, that Vomiting might follow, oftentimes an irritation of the Palat or Throat is fain to be supplied, secondly the more strong Emeticks, (and which more properly belong to this Class) are Medicines of that sort, that if they be taken in due qnantity they stir up Vomiting almost in all persons: of which are first of all white Hellebore, *Nux vomica*, Vitriol, as also the various preparations of Mercurie, which although proper enough

enough for the uſe of a Phyſitian, yea although they are indeed very neceſſary, yet as to their Nature and Forces, in which the emetick Power conſiſts, they ſeem to differ little from Poyſons; wherefore if they be given in too great a doſe, they do not rarely cauſe Death. By what courſe and after what manner of affecting, theſe do operate in the Ventricle and on the other parts of the humane Body, now indeed remains to be inquired into; we will firſt of all add the moſt notable *Phænomena* which do chiefly occur in this kind of Evacuation.

Part I.

The more ſtrong differ little from Poyſons.

Antimonial Emeticks and other more ſtrong being taken into the Stomach, are not wont preſently (unleſs in ſuch who before-hand loth them) to irritate, or to give a ſenſe of their trouble; but afterwards ſometimes ſooner ſometimes later, a nauſeouſneſs and perturbation is perceived, then a contraction of the Stomach, and aſcending, with an opening of its Orifice and a leaping up of the *Oeſophagus* towards the Throat follows; and preſently after Vomiting; this being done, theſe *Viſcera* ſink down, and for a little time are quiet: but a little while after the inquietude of the Stomach, and nauſeouſneſs and the aſcenſion of that, and of the Throat returns with Vomiting, and ſo the force of Vomiting, and ceaſing from it, are often repeated by turns, until this operation ceaſes, the ſtrength of the Medicine being wholly worn out.

By what means they operate in the Ventricle.

At the beginning of Vomiting the Ventricle ſeems only to be contracted upwards, and not to be hugely provoked. Afterwards, its Convulſions are more vehement, and unfold themſelves more largely, ſo that the *Duodenum* by an inverted motion, directs its contractions upwards, and whatſoever is contained in the Stomach (which is the intent of the emetick irritation) pours forth: if the irritation be yet further ſtretch'd, there not only follows Convulſions, but often times diſtentions, and puffings up, and the more dangerous Convulſions of the Ventricle, to wit, a yexing or hickcock: and truly by reaſon of the animal Spirits being diſturbed in their whole *Syſtaſit*, and ſometimes too much diſſipated or excited, frequent Swoonings, cold Sweats, and not ſeldom deadly Convulſions of the Members or of the whole Body happen.

And by what rite or manner they affect it.

A ſtronger Emetick being taken, when the Stomach begins to caſt, firſt of all is caſt out that which fluctuates in its Cavity, next whatſoever of viſcous Flegm that ſticks to its hairy Scurf or is hid in its Folds. If the Vellication perſevere, the ſerous Humours are preſſed forth of the little Mouths of the Arteries and Nerves; then the Convulſion being communicated to the *Duodenum* by its Pipes, the Choler and pancreatick juice being extorted from the Paſſages, they are carried forth and ſpread into the Ventricle. Hence the bilious matter for the moſt part is caſt forth laſt of all, and then not ſeldom mere Bile is copiouſly vomited forth: which if it ſo happens, upon every turn of excretion, Pains being excited a little below the Ventricle on the right ſide do creep upwards; which without doubt proceeds from the Biles being thruſt out into the *Duodenum* and from thence ſpread abroad within the *Pylorus* by reaſon of the convulſive Motion, and inverſion of the Inteſtines. If that the irritation doth not yet ceaſe, the Arteries (their little Mouths being highly irritated) do pour forth the Humours to be purged out, from the whole maſs of the Blood.

What ſeveral ſorts of matter, and of what kind, are caſt out by Vomits.

From this Hiſtory of Vomiting it may be lawful to conjecture, how and by what means an emetick Medicine doth operate, *viz.* this being immerſed in the Ventricle, mingling it ſelf with the Humour which is conteined in that place, and impreſſing its Tincture, by little and little is received by the hairy Cruſt covering the inward Superficies: from thence the nervous Fibres, framing the interior Coat, and ſuſtaining this Cruſt, leaſurely imbibe this virulent Tincture; with which when they are in part filled, they begin by reaſon of the incongruity of the Juice, to grow into Wrinkles, and to be greatly unquiet, from whence the overlying fleſhy Fibres, being irritated becauſe of the grief received from the nervous Fibres, they begin here and there up and down, the firſt lighter Convulſions; from whence comes a nauſeouſneſs and perturbation of the Stomach; and by and by the Spirits inhabiting all thoſe of either interior order grow highly angry, and thruſting themſelves forth they cauſe very ſtrong and emetick Contractions, whereby that grief ſhook off from the nervous Fibres might be caſt forth by Vomit: and when by this means theſe Fibres are freed from the medicinal Juice which they had drunk in, the endeavour to Vomit Ceaſes for a while; until being again imbued with a new proviſion of the Virulent Tincture, which

The reaſon of vomitory Medicines and the manner of their working deſcribed.

Part I.

they had then drawn from the hairy Cruſt they are provoked into the like trouble and emetick Irritation: and ſo often the force of Vomiting is repeated until the matter of the poyſonous Tincture, be alſo cleanſed from the hairy Cruſt and that it be at length wholly caſt out a doors, and that the nervous Fibres of the interior Coat do not imbibe any more of that Poyſon.

Wherefore Emeticks operate by turns and intervals.

But indeed it doth not always follow that Vomiting doth therefore ceaſe, although the Medicine be wholly caſt out, and none of its Contagion left behind, for notwithſtanding thoſe Spirits of the Stomach oftentimes, being too much provoked they very hardly lay aſide their Furie; ſo that they are irritated by any other Juice which the nervous Fibres drink in, and are agitated into emetick Convulſions, and alſo repeat them by frequent Fitts: wherefore then, that Vomiting might ceaſe, there ſhould nothing either of nouriſhing or of cordial Drink be taken into the Ventricle, but it muſt be appeaſed by ſleep, and the application of an outward fomentation.

Wherefore Vomiting is eaſily quieted.

The Humours being expreſſed into the Ventricle oftentimes increaſe the operation of the Medicine.

Further ſometimes other Humours being expreſſed out of the Veſſels, and poured into the Ventricle eſpecially from the paſſage of the Bile, doth not only add ſtrength to the Vomitory Medicine, but its operation being ended, they continue, to provoke the Stomach further, and to urge it into excretorie Contractions: yea its nervous Fibres drink in that yellow Poyſon, not leſs troubleſom than the emetick Tincture, excite Convulſions, and continue beyond the force of the Medicine, theſe frequent fits of Vomiting, for the thruſting away that grief. For this reaſon, when that Choler abounds, upon every light occaſion it is ſent into the Stomach: and very often by the moſt gentle Medicine a cruel Vomiting with horrid Symptoms is excited, for the appeaſing of which it is convenient to exhibit an aſſwaging Gliſter, whereby the turgencie of the choler may be ſolicited towards the inferior parts.

Wherefore Vomitory Medicines work in ſome ſooner or preſently.

But that ſometimes Vomiting immediately follows the emetick being taken, when, to wit, the Medicine is ſcarce got to the bottom of the Ventricle, nor yet entred deeply into its Fibres, the cauſe is, either that the hairy Cruſt being in ſome part worn out (as it is wont in Gluttons, and great Drinkers) the nervous Fibres being naked are quickly and eaſily irritated, or becauſe the phantaſie, being averſe to the Medicine, it firſt of all brings in a nauſeouſneſs, or laſtly becauſe the Stomach being much burthened with the putrefaction of the excrementitious matter, it was before hand prone of its own accord to Vomit. As to what appertaines to the nervous Fibres which drinking in the emetick Tincture conceive a Senſe of the Grief, whereby the fleſhy Fibres are irritated into contractive Convulſions; they are indeed the ſame, which cauſe very much the hunger or barking of the Stomach, being emptie, and being dry, thirſt; and being ſatisfied by the grateful Juice of the aliments, they communicate a complacency to the Ventricle, and a refection beſides to the whole Body.

Vomitorie Medicines in ſolid forms work.

It is obvious enough to be underſtood when as they are wont to adminiſter Emetick Medicines in a liquid or a ſolid form, how the former do come to an irritative plenitude. But yet as to the latter it is doubted by ſome and that deſervedly, even by which way a very little Powder, as of Antimony or of the Flowers of Antimony, being taken in weight but three or four Grains, ſhould cauſe ſo very great Vomiting; when from ſo ſmall a Medicine, and not eaſilie penetrating, it ſhould ſeem that theſe Fibres ſcarce in any part ſhould be imbued, at leaſt not ſo much as might ſuffice for an emetick irritation. For this we ſay that that Medicine given in a dry ſubſtance, is preſently diſſolved, and doth impregnate the Humour great enough in the Ventricle, ſo as by an Infuſion made even of *Crocus Metellorum*, the Stomachal Fibres imbibe the diſſolved particles of the antimonial Sulphur, and from thence are irritated into emetick Convulſions.

Vomitory Medicines do not operate alike in every doſe.

What is aſſerted by ſome that a vomitory Medicine given in how great a doſe ſoever doth not operate more ſtrongly, than if it had been taken only in a leſſer quantity, is very far from the truth, and the experiment of this thing is not to be made without danger; for that if there be more particles of the Medicine, they alſo imbue the more Fibres, and entring more deeply into them, they more grievouſly provoke them, ſo that more cruel and frequent Convulſions muſt neceſſarily follow.

Vomitory Medicines are not indued with a ſpecific Vertue.

As to the vulgar opinion, that Vomitory Medicines do agitate the Humours upwards and ſift them out through the upper parts by a certain ſpecifick propertie, it

ſeems to be meerly frivolous; for of what ſort that Virtue ſhould be, none hath been able to explicate, nor indeed to prove that there is in truth any ſuch thing. In the mean time for the underſtanding of the Emetologie it will be enough to conceive that the particles of a Medicine very infeſtous to Nature being imbibed by the nervous Fibres of the interior Coat of the Stomach, do induce a great trouble to them; from thence that that Juice might ſuddenly and the neareſt way be expelled again, the fleſhy Fibres of the other Coat are irritated, and inſtigated into Emetic Convulſions. But that indeed is urged by ſome, that white Hellebore applyed to the Navel, and an infuſion of *Crocus Metallorum* given gliſterways doth move to Vomit, haveing often made the experiment I cannot find to be true. But if it ſhould be ſo ſometimes, why ſhould not a violent irritation inflicted on the Inteſtines, at the ſame time ſtir up Convulſions and inverted Contractions, and afterwards ſecondarily and by conſent Vomiting in the Ventricle? (by the like way indeed, this affection of the Ventricle, comes oftentimes in the colick, and in the Iliac Paſſion) one time, I injected into the jugular Vein of a ſtrong Dog about ſix ounces of Wine impregnated with an infuſion of Antimony; about five or ſix minutes after he began to reel, and faulter in his going and afterwards to Vomit extreamly. But we may ſuppoſe this effect to have been cauſed from the Medicine aſſaulting the Brain rather then the Stomach, when the like Vomiting follows after a Liniment or a Fomentation of the Juice or decoction of Tobacco applyed to the Head. Part I.

They operate not on peculiar Humours.

Neither is that opinion built upon leſs trifling Foundations and as we judge, as far from the truth, which affirms certain vomitory Medicines to work upon choler, others on Flegm and others on Melancholy, and to bring away this or that Humour, ſearch'd out and as it were whole from the reſt. But about the choice to be made in Emeticks, the cheif regard of the difference to be obſerved is, that in ſome griefs the more gentle are to be adminiſtred, which diſturb nothing beyond the Ventricle, and do gently bring away only thoſe things which flow about its Cavity, or adhere to its Coats: in other caſes more ſtrong are convenient, that by a Convulſion communicated alſo to other *viſcera*, whatſoever excrements overflows in them, or is heaped up any where elſe, may be moved out of the Mine, and preſently caſt forth a doors either upwards or downwards. And for that ſometimes a viſcous Matter and as it were Phlegmatic is cheifly ſifted forth, the cauſe is, for that the ballaſt of the Ventricle, the receptacle of the bilious Humour being unſhaken, is almoſt only purged out, but when the choler-carrying Veſſels are cleanſed, the excretion comes forth the moſt part bilious. The Vomiting of a black Humour depends very much upon the Tincture of the Medicine, for vitriolated Medicines infect the out caſt Matter with blackneſs.

From whence that vulgar Error aroſe.

The emetick Evacuation if it be convenient is more Efficacious than any other.

Evacuation by Vomit as it is more violent than by Stool, ſo if there be ſtrength to bear it, in ſome diſeaſes it is more profitable or helps more than ten purgations. For by this means heavie Phlegm growing in the Folds of the Stomach, which all the other Catharticks ſlide beſides, is purged away or cleanſed as with a Broom, beſides the neighbouring parts, the Pancreas, Meſenterie, Spleen, and Liver it ſelf are moved by its ſtrong Convulſion, ſo that obſtructions made in them alſo, whatever ſtagnations there be of the Blood and Humours, are eaſily removed by this kind of Remedy. The extraneous Ferments begot every where in the Body, and alſo the more ſecret Seeds of Diſeaſes are rarely extirpated without the applying of vomitory Medicines; but chiefly in the Diſeaſes of the Brain and Nerves the uſe of Emeticks is eſteemed very helpful, for by this kind of evacuation, not only the Filth of the Stomach and the Inwards, which pollutes the Chyle and Blood, is plentifully cleanſed away, but alſo the Glandulas, which are the emunctories of the Blood, and nervous Juice, being placed in the *viſcera* are ſqueeſed. the Choler-leading Veſſels, and other receptacles of the Excrements are copiouſly evacuated, for that the ſame being emptied they more readily receive the *Serum* and other Purges of either Humour, and the ſuperfluities otherwiſe apt to reſtagnate into the Head: moreover, when as the innumerable little Mouths of the Arteries under the hairy Cruſt do open into the Ventricle, this being by a vomitory Medicine notably hauled, they pour forth what vitious or malignant Humours are abounding in the Blood, and there by Vomit they are ſifted forth, and therefore it is chiefly for this reaſon difficult diſeaſes are beſt cured by Emeticks, and ſcarcely without them. For truly theſe Medicines ſhould be of an untamable and active

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Nature, and not only ſqueez forth the ſuperfluous Humours from the maſs of the Blood by pulling and hauling the Arteries, but ſcatter abroad the Blood, by entring into the Pipes of the Veins, which there do gape and are innumerable, and do precipitate its ſeroſities and other excrements and cauſe them to ſeparate. But in the mean time this emetic Evacuation ought not to be uſed indifferently by all; For that in ſome the tone of the Ventricle is too lax and weak, and the conſtitution ſo tender that the Spirits immediately become faint with vomitory Medicines, and looſe their ſtrength: others again have *Viſcera* of an immoderate and pertinacious Senſation, that although they are very difficult to Vomit, yet having once begun Vomiting it is not eaſily allayed, but with the very often endeavouring to vomit, they are brought to a great loſs of their ſtrength and to a failing of their Spirits.

But more Dangerous.

The Indication of the vomitory Medicine.

Wherefore that the vomitory Medicine may be rightly exhibited, we ought to weigh, what are its Indications or Signs of the need of it, to whom to be permitted, and to whom to be prohibited. Emeticks ſeem to be needed, when the bilious and bitteriſh Humour fluctuates in the Ventricle, that from thence a nauſeouſneſs, an ingrateful ſavour, or ſhort Headach do ariſe, alſo if the Stomach be burthened with a clammy Phlegm, as in the long diſeaſe of Maids, and in Men after Surfeting, and inordinate Eating. In moſt caſes when with difficulty of Breathing the Ventricle being full is affected with a Queaſineſs or Nauſeouſneſs, evacuation by purging is wont to be uſed. Further when the Stomach is preſſed with an extraneous ferment that what ſoever is put into it is preſently caſt back again by Vomit, alſo by reaſon of far diſtant parts, Vomiting is not ſeldom uſed ſuccesfully: for by this means the Choler-carying Veſſels are very greatly emptied, that the Choler being plentifully powred forth from the Blood its feveriſh dyſcraſie may be taken away. Furthermore, for as much as the ſuperfluities or ſtagnations of the nervous Humour are moſt eaſily cured by the means of this evacuation; in the Gout, *Aſthma*, Epilepſie, Madneſs, and very many other Diſeaſes, which are accounted great and difficult, the uſe of Emeticks comes to be no ſmall means of curing.

2. *To whom permitted.*

Secondly they permit the taking of this Remedie, where there is ſtrength of the *Viſcera* and firm conſtitution of Body, and chiefly to theſe who have a more ſhort Breaſt and Neck, and whoſe Mouth and Ventricle are not far diſtant: alſo the Laxity of the Matter to be purged forth, a ready ſeparation, alſo an appeaſing of Nature, and an intention or leaſure to this work make for the facility of Vomiting.

3. *To whom prohibited.*

Thirdly they prohibit an Emetick where there is a difficulty of Vomiting or an unaptneſs found by a former experience, a tender and ſoft conſtitution of Body, a tall, and ſlender Stature, infirm Inwards, and breifly where there is a conſumptive diſpoſition, with an Ulcer of the Lungs, or ſpitting of Blood: alſo a too great Cachexie or evil diſpoſition of Body in which there is danger, leſt the Humours ſhould be preſſed forth from the whole Body into the Ventricle: alſo they exclude altogether this kind of Evacuation where there is an unwonted effervescency of the Blood, the Paroxyſms of Feavors, and the expectation of the Criſis.

The Diviſion of Emeticks.

The Medicaments whcih are called Vomits are wont to be diſtinguiſhed according to the force of their operating into gentle, mean, and ſtrong: as to the matter out of which they are taken or prepared, it is out of the parts of Minerals, Vegetables and Animals: as to the ſavour they are very ingrateful to the Palate, as Vitriol, Tabacco, Roots of Bryonie *&c.* or grateful enough in Savour; as the Fruit of Mezereon, Indian Nut, the Spawn of the Barbel or Mullet, or elſe almoſt inſipid, as the Flowers of Antimony, *Crocus Metallorum*, *Mercurius Vitæ &c.*

Chap. II.

Part I.

Chap. II.

Prescriptions of Vomits, and the declaration of the Reasons of some of them as to their preperations and Chymical Analysis.

Take of Oxymel of Squills ℥iß *of Wine of Squills* ℥iß, *mingle them and make a Vomitorie.*

Take from 6 *to* 9 *of the fresh Leaves of Asara bacca, Bruise them and put them into* ℥iij *of white Wine, squeese them forth, and take it with care.*

Take of the Powder of the Roots of Asarabacca, ℥j *to* ℈iiij *of Oxymel of Squills* ℥iß *mingle them and take it in a draught of Posset-drink.*

Take of the Salt of Vitriol from ℈j *to* ℈ij *or* ℥j *let it be taken in a draught of Posset-drink.*

Take of the infusion of Crocus Metallorum ℥ß *to* ℥ß *or* ℥iß *let it be taken in a draught of Posset-drink with governance.*

℞ *Of the infusion of Crocus Metallorum* ℥vj *of the Wine of Squills* ℥iß *of the Syrup of Vinegar simple* ℥ß *mingle them and make a Vomitorie.*

℞ *Of the Sulphur of Antimony* gr. vj *to* viij *of the Cream of Tartar* ℈j *mingle them, let it be given in the Pap of an Apple, or in a stew'd Prune or a spoonful of Grewel.*

℞ *Of Mercurius Vitæ* gr. iij *to* vj *take it after the same manner: so likewise are taken the Flowers of Antimony, or Aurum Vitæ or Præcipitatum Solare, and Turbith Minerale.*

The Chymical Emeticks which are cheifly known are prepared first out of Vitriol, secondly out of Antimony, thirdly out of Mercurie.

Salt of Vitriol.

THe Salt of Vitriol is prescribed after divers manners, *viz.* from elixiviated Colcothar, out of blew Vitriol calcined, and washed according to *Angelus Sala*, and out of white Vitriol purified by many Solutions and Coagulations, which Medicine is commonly called the *Gilla* of *Theopraſtus*, it is the safest and most easily prepared of them all; but the two first Medicines are notably Styptick, and as often as they have passed the Fire yet some Corosiveness remains: but the last is gentle enough, it pulls the Fibres of the Stomach softly and makes it somewhat to wrinkle it self, so that, at last, that they might shake off the Grief, they fall into Convulsions and endeavouring to Vomit, which notwithstanding quickly pass off, and the perturbation of the Ventricle is presently appeased. *Vitriolated Emeticks.* *The Gilla of* Theophrastus.

The Salt of Vitriol is therefore the more esteemed, because that it very rarely moves beyond the Stomach, neither like Stibiated Medicines causes the Convulsions of the Inwards and inordination of the Blood, or failing of the Spirits, but yet it hath a fault that it operates slowly, and sometimes scarce at all, wherefore when Vitriol is taken, there is need oftentimes of drinking good store of Posset-drink, to provoke Vomiting by a Feather put down the Throat, or to help it with Carduus Posset or Oxymel of Squills. *Its use.*

Crude Antimony, the whole mixture remaining, works neither by Vomit nor by 2. *Antimonial Emeticks.*

Part I.

Crude Antimony is no Emetick.

In what the Emetick Virtue of Antimony consists.

by Stool, the reason of which is because that the saline and sulphureous particles from whence the Emetick Virtue proceeds, being bound up in it, and being involved with others, they cannot put forth themselves; notwithstanding this Concrete being unlocked by a certain preparation, and somewhat loosned, those Particles being freed they are rendred ready for Action. But if it be inquired into whether the vomitive Faculty depends on the Sulphureous, or on the Saline Corpuscles? it seems to be of neither apart, but of both combined together: for when that those are given apart from these, as in the Tincture of Antimony, or these from those, as in its Cerus, no Vomiting follows. We have elsewhere taken notice that mere sulphureous or saline Particles tasted and smelt scarcely move, but both together conjoyned do strongly affect these Senses. In like manner we judge it to be with the peculiar Sense of the Ventricle, that even it doth receive great pleasure, and trouble from sulphureous Salts, and that in their grateful or displeasing Compositions both Cordials and Vomits do consist.

By what means its particles are made Emetick.

Stibium, that it may be made an active Medicine, is wont to be prepared either by it self, as it is done in the Glass, and Flowers of Antimony, or with Salts and that either with Salt Nitre, as its Crocus, or with fixed Salt, as its Sulphur, or with acid Salt, as its Butter, and that which is made out of it *Mercurius Vitæ*. There are more emetick Preparations of Antimony, but these aforesaid are of chiefest Note, and are most commonly used. Care is first of all to be taken that the Antimony, by which both these Medicines or any others are rightly prepared, be chosen pure and unmixed with Lead. As to that, besides the brightness and firmness of its Streaks, the most certain way of tryal is, that a little piece of the corrected Mass be Calcined with an equal part of Nitre, it is a sign of its Goodness, if it shall run into Liver and Dross, for otherways a part of it melts into pure Lead. By this means sometimes I have gotten out of one Pound of Antimony two Ounces of Lead.

1. *Glass of Antimony.*

The Glass of Antimony.

℞ Of the Powder of Choice Antimony as much as will suffice, let it be calcined in an Earthen vessel, work it till it hath left off smoking, and acquires an ash or grey Colour; the matter being taken away and enough subdued in the Crucible, let it be poured forth on a Table or on a Skin, growing stiff into a clear Glass, it goes into a purplish Colour. The Dose of this Powder is from *gr.* iiij to vj, of the infusion in Wine the Dose is ʒvj to x: it works strongly.

The Reason of its preparation.

The reason of the aforesaid preparation (as I think) is this. Antimony in the Calcining of it is so long agitated, that whilst the Sulphureous particles do copiously evaporate, the saline Particles, being apt to vitrifie may run together more thickly; which afterwards, whilst the Mass is melted by a strong fire, laying hold on the attenuated earthly particles, they easily grow together into Glass: which by reason of some sulphureous Particles yet remaining growes red and becomes an Emetick. For indeed the *Stibium* is in a great part or altogether deprived of its Sulphur, to be disposed into Glass, as it manifestly appears by this, for that the *Calx* or the *Caput Mortuum* that is left of the distillation of the Butter of Antimony, melts by fusion into Glass; which notwithstanding is White and voyd of an emetick Virtue, for that all the Sulphureous Particles ascending had altogether left that Mass.

2. *The Flowers of Antimony.*

The Flowers of Antimony.

Take of Select Antimony and powder'd what you will, let it be sublimed in a Cucurbit with an Alembick or an earthen Vessel fit for this Work with a moderate Fire, either by it self or with Sand, or the Powder of Bricks, or Calcined Tartar mixt with it: the Flowers ascend Yellow, Citron Colour, and White, of which those that are White are Collected, and reserved for Use.

The reason of its preparation.

In this preparation the Saline and Sulphureous Particles of the Antimony ascend, the waterish and earthie being shaken out, and combine together; wherefore, when both the mineral Body is very much opened, and chiefly the active little Bodies

Bodies (the more heavy, which did blunt them being put away) are joyned together, this becomes a strongly Vomitive Medicine, and not very safe. Its Dose is *gr.* ij, iij, iiij. Part I.

3. *The* Crocus Metallorum.

Take of picked Antimony and of the most pure Nitre alike ʒiiij, pounded asunder, and carefully mixed in a brasen Morter, and by flinging in a live Coal set it on fire, and it will burn with ratling Noyse: at length the Mass being left somewhat reddish (which by reason of the Colour is commonly called the Liver of Antimony) is separated from the dross partly black partly white lying about it, and reserved for use. The Liver is given in substance to *gr.* iij, iiij or v; the Wine of its infusion from ʒß to ʒj or ʒjß. This works well enough, and is the most used Emetick. *The preparation of the Crocus of Metals.*

The reason of this Process is, that the Nitre be pounded, and mixt with Antimony as it were with common Sulphur, that both the mixtures might be easily fired, for that both the Particles, to wit, the nitrous and sulphureous being requisit to or fitted for ny accension or burning do copiously and intimately come together or agree. By this conflagration the mineral Body is sufficiently opened, and its Particles loosned one from another, and although a certain proportion of the Sulphur flyes away, there is however enough left that combined with the Salt doth produce a rubie Colour, and emetick Virtue. In this preparation if that the Nitre be mingled in a greater proportion, the Antimony will be too much calcined, and the remaining Mass after its burning, being imbued with less Sulphur, becomes no more red, but yellow or citron Colour, and less Vomitive. *The account of the reason of it.*

4. *Sulphur of Antimony.*

Take of the Salt of Tartar or of Wormwood ʒviij, let it be melted in a Crucible set into a Wind Furnace, then cast in one Spoonful after another ʒvj of crude Antimony pulverised, let it flow for a quarter of an Hour, then pour it forth into a silver or brasen Vessel, and let the Mass of a saffron or yellow Colour be edulcorated by often washing it. The Dose is from *gr.* v to x: it works much gentler and kindlier than any other preparation besides. *The preparation of the Sulphur of Antimony.*

In this preparation the fixed Salt being made to flow by the Fire unlocks the Body of the Antimony which is chiefly composed of Sulphur, and an acid Salt, for whilst that the Salts are so combined, the sulphureous Particles are the more loosened, and the saline Bitings become less sharp; wherefore though it may be highly red, yet it doth not greatly or violently irritate the Stomach: further by reason that the Sulphur is more loosened and the Salt more at liberty, its Powder easily communicates its Tincture to the Spirit of Wine; which, when that it hath quite forsaken the saline Particles, it looses its emetick force, and becomes a notable Comfortative. *The reason of it.*

That indeed Antimony, and common Sulphur, and perhaps many others of the same nature, consist of an acid Salt and Sulphur combined together, may be made evident by very many experiments: for besides that the Concretes of the same kind are easily unlocked by fixed Salt, further if at any time they are dissolved by a sulphureous *Menstruum*, as Oyl of Turpentine, Juniper or Linseed, their Sulphureous Particles being imbibed by the Solvent, the remaining saline Particles (which distilled, run into an acid Liquor) do easily grow into Crystals: This is most evidently plain in the preparation of the Balsam of Sulphur. But if an acid *Stagma*, to wit, *Aqua Fortis* or *Aqua Regia*, be poured upon pulverised Antimony, and distilled with a strong fire, a citron coloured Sulphur hardly to be discerned from the common Sulphur will be sublimed in great quantity; it being certainly an assured mark that the common Sulphur consists cheifly of sulphureous little Bodyes compacted with an acid Salt. Out of the Sulphur of Antimony prepared as it is above described, I make a Liquor of an oyly form, *The Synthesis of Antimony and common Sulphur.* *Their Analysis.*

which

Part I.

which very pure Sulphur of Antimony will guild Silver at the first smearing over, and is of excellent use in Medicine.

Mercurius Vitæ.

Take of Choice Antimony and Mercurie sublimate alike ℥vj let them be pounded together, and being well mixt distilled in a glass Retort in Sand, a gummie Liquor will ascend like Ice exceeding corrosive, which adhering to the Neck of the Retort melts if you apply Fire to it, and falls down into the receiver. This being cleansed by rectification or by flinging therein spring Water it will be precipitated into a most white Powder, the Water in the mean time getting a sharp taste like the Spirit of Vitriol. This Pouder being edulcorated and dryed is, commonly called the Mercury of Life and *Mercurius Vitæ*, but not truly, when as it contains nothing at all of Mercurie in it, and unless it be cautiously given, it is oftner the Author of Death than of Life. Its Dose is from *gr.* iij to vj.

The reason of this preparation. In this operation the Spirits of the acid Vitriol and Nitre, being combined first of all with the Mercury in the Subliming, when they are loosned by the Fire, deserting that first guest, they more lovingly embrace the little Bodies of the Antimony, and when being elevated by the force of the Fire, they grow together into an icy-form substance, which consists of the whole Sulphur of the Antimony with a little of its Salt, and also of the sharp *stagma* of the Nitre and Vitriol, by reason of the saline Particles it grows stiff like Ice, and because of the sulphureous Particles it is melted by the Fire. This matter, Water being poured thereon, is precipitated into a white Powder, which consists meerly of antimonial Bodies, like to the Flowers of Antimony; in the mean time the sharp Salts being loosned in the *Menstruum*, they make it sharp like the Spirits of Vitriol. But that notwithstanding, this Powder hath nothing of Mercury in it, it is clear, because this being deprived of its congelative Salts, it resumes its ancient species of Quicksilver, and the whole is collected in the retort. And truly those Salts are eatily taken away from Mercury, and of their own accord desert it, as often as they find another Body more friendly: hence if that you boyl sublimate with iron Plates in ordinary Water, by and by the Salts embracing the Iron, the Mercury revives.

The correction of this Medicine. This too cruelly vomitive Powder if it be brused with calcined Sea Salt, and sweetned by often washings, becomes much gentler, and safe enough, for that the sharp pricking Salts of the Medicine are consumed, or overcome by the Salts of another disposition. Further if it be put to fusion with Nitre in a Crucible, the sulphureous Particles being wholy taken away, it forthwith looses its emetick Force, and even becomes pure Diaphoretick Antimony.

How antimonial Vomitories operate in our Bodies. So much concerning antimonial Vomitories whose Particles being dissolved in the Stomach give it a sulphureous-saline Tincture, which its Fibres Imbibing, are so notably hauled that a Convulsion being there excited on every side through its whole Cavity, as also reaching to its near adjoyning *Viscera*, to wit, the *Duodenum*, the Choler-bringing Pore, the Passage of the *Pancreas*, it causes what is contained in them all to be squeesed forth, and to be emptied into the Ventricle, yea the serous Humours to be drawn from the little Mouths of the Arteries, so that cruel Vomitings and Vexations follow for a long time after. It is also probable that some of its emetick Tincture is likewise received into the Veins, which by means of the running together of the Salts is delated thorow the whole sanguineous Mass, and induces struglings and combinations, Precipitations and Excretions of a certain matter: wherefore the Diseases of parts at a great distance, to wit, cutaneous Diseases, Leprosies, and Gouts, are sometimes cured by antimonial Medicines.

How Mercurials. But yet Mercurial Medicines (of which we shall speak next) do effect this much more powerfully; for that they stir up not only Vellications and vomitive Excretions in the Stomach, but moreover by their more active Particles communicated to the Blood, they cause its divers manners of Fluxions, and also dissipations, precipitations, and separations of the Serous and of other Humours; by which means besides Vomiting and Purging, evacuation by Urine, by Sweat, and sometimes Salivation

tion is procured, wherefore in inveterate and contumacious Diseases they run to the use of these as to the last refuge.

Mercury or Quicksilver if it be taken simple and by it self, like Antimony, works neither by Vomit nor by Stool; and stirs up almost no perturbation in mans body. But if by a dissolving mixture, its active Particles being set at liberty, it be reduced to powder; it becomes an highly purging Medicine. Though there be very many ways of fixing this versatile and fugitive *Proteus*, and of preparing it for medicinal use, these two chiefly are insisted on, that is to say; it is either sublimated or reduced into a precipitate. Its preparations of the first kind do not properly belong to the Class of Emeticks, but for the latter almost every one of them ought to be referred hither. But as to our purpose it will be sufficient briefly to touch upon here a few of them and which are of chiefest Note. Therefore first of all we shall inform you, that Mercury is either precipitated by it self, or with Metals alone, or with Salts alone, or with Metals and Salts together.

Mercury or Quicksilver is no Cathartic of it self.

By what means it is made operative.

1. *Mercury precipitate by it self.*

Mercury precipitated by it self.

Take of the best purified Mercury ℥iij, let it be put into a Glass fit for this use (which is coming something near to the form of an Hour-glass, with a double bottom like a Top, let it be broad and plain at either end, and strait in the middle, having a Beak with a very small Orifice reaching from the bottom of the one into the belly of the other) which Vessel being equally placed in a sand Furnace; put thereto fire at first gently, afterwards more strongly until part of the Mercury be elevated in a greyish Powder, and the other stick like Quicksilver in the upper bottom: Then turning the Vessel let the upper part be put into the Sand, and so turn the Glass so often till all the Mercury goes into Powder, which breaking the Glass, is to be collected, and to be washed with sweet water: The Dose is *gr.* iiij to 5 or 6. it for the most part moves to vomiting, and doth not work by salivation.

The reason of the Process seems to be this, that the *Effluvia* of a constant Fire do first of all loosen the Concretion of the Mercury, and dissolve by little and little its particles, and then draw them one from another, so that they fall away one from the other; and as it were, broken into bits, may remain distinct. Hence those most active little Bodies, being of their own nature Saline and Sulphureous, stir up mighty perturbations in the Humane Body, by pulling the Fibres, and by heating them with their Salts: But yet this Precipitate works less upon the Salts inhabiting the Blood, than Mercury precipitate with Salts, because a Salivation is easily excited by this, never by that. Even as Mercury, so certain other Mineral Bodies, as Lead, Tin, Antimony, Iron, are wont by the force of a constant Fire to be Calcined to Powder or *Crocus*.

The shewing of the Reason of the process.

2. *Mercury precipitate Solar.*

Mercury precipitated with Metals of the Sun.

Take of Gold purg'd with Antimony, and exactly purified, ℥j. of the very best depurated Quicksilver or drawn forth of Cinnaber and Sublimate ℥viij. make an *amalgama* in a Crucible, by casting in the Gold, being made hot, to the Mercury while it is melting: This being well washed with Salt and Vinegar, and wrung thorow a Cloth into such a Glass, prepared like that for the Mercury, precipitated by it self; let it be digested in sand, until it be reduced into a red Powder: Then let it be edulcorated with Cordial waters. The Dose is from *gr.* iij to vj. it operates only by Vomit for the most part, and moves not as the saline precipitate, to Salivation. After the same manner may the Lunary, and Jovial precipitates be prepared.

The reason of this Process is as the former, to wit, the little Atoms of Fire, as so many little Pestles beat the Mineral Body into small parcels, and break them so for the time, that they cannot easily cohere and grow together again. Further, this *Amalgama* by reason of the Bodies of the Mercury and the Gold being first opened by themselves, doth much easier become precipitated, than the Mercury by it self.

The reason of the preparation.

Part I.

3. *The Common Mercury precipitate.*

Mercury precipitate with Corrosive Liquors.

1. *with* Aqua fortis.

Take of the best purged Mercury ʒij. of *Aqua fortis* ʒiiij. make a solution, which being put into an Earthen Vessel glaz'd, let it evaporate first with a gentle heat to consume its moisture, then by increasing the fire till the Vessel glow again, let it be calcined, stirring it about with an Iron Rod till it acquires a red Colour. The matter being taken forth and powder'd, first by often washings with sweet water; then the burning it being reiterated, let it be edulcorated by the affusion of spirits of Wine, and so kept for use. The Dose is *gr.* iij to v or vj. it operates violently enough by Vomit, and provokes by Salivation more certainly than any other preparation of Mercury whatsoever.

The reason of the preparation.

If the reason of this Chymical Preparation be enquired into, we say that the Mercury is dissolved by the *Aqua fortis*, for as much as the saline Particles of the *Menstruum* running to meet the Salts of the metal, they presently snatch them to themselves, and then the bond of the mixture being loosened; all the other Particles are set at liberty, and hide themselves on every side within the pores of the *Menstruum:* Then after that the Humidity is taken away, the saline Particles being left and brought into view, they forthwith strike upon the included Mercurial Particles and are mixed together every where. But as Mercury precipitated after this manner with *Aqua fortis* or *Aqua regis* grows red, otherwise than it doth prepared with Oyl of Sulphur or Spirit of Vitriol; the reason is partly from the Nitre always causing a flamy colour which enters into that *Menstruum* and not into these, and partly from the Mercury it self, whose loosened Particles, whilst at liberty and not hidden by others, of their own nature are red, as may be perceived in Mercury precipitated by it self, and in its solution, which, to wit the Mercury, loses its red powder, being infused in the Oyl of Tartar.

Its precipitaton with Oyl of Sulphur or Spirit of Vitriol.

How Mercurial Medicines operate in the Ventricle.

This Medicine consisting very much of Corrosive Salts, and also of equal loosened Mercurial Particles, for as much as it highly irritates the Fibres of the Ventricle, stirs up most violent Vomiting, so that for this purpose 'tis seldom given alone.

But if when it is taken, and that at last having gone into the Ventricle and passed the first passages; it be carried into the mass of the blood, for as much as its implanted Salts are thereby very much fermented, and that the Mercurial Particles being plentifully infused, and intimately mixed with them are so intangled; that they cannot by any way more commodious be thrust forth again (as we shew in another place) than by the salival passages, for that reason this Medicine moves spitting more than many others.

4. *The Turbith Minerale.*

Mineral Turbith.

Take of purified Quicksilver, Oyl of Vitriol (or of Sulphur *per Campanam*) dephlegmed, alike equal parts, being putin to a Glass retort; let them be distill'd, the Fire being increased by degrees until all the humidity be drawn away, there remaining in the bottom a white Mass: Which, spring water being poured thereon presently becomes yellow, this by often washing and firing of the Spirit of wine being edulcorated and dryed, may be given from *gr.* iiij to vj or vij. It works by Vomit somewhat gentler than Common precipitate, and sometimes also it procures salivation.

The reason of the preparation.

The process of this as to the precipitation of the Mercury, hath the same reason as the former, but the remaining Calx does not grow red as the former; partly for the absence of the Nitre, and partly because the Mercury being less subdued does not suffer so intense a Calcination; that the Salts being in a great part blown away, it should shew its own proper Colour, to wit, a Crimson Colour: But if for that end it should be urged with a violent fire; it will fly quite away: Therefore the white Colour proceeds from the Salts which stick to the Particles of the Mercury, which being afterwards something washed away, the yellowness succeeds.

Further in as much as the Mercurial Particles are not so strictly combined with the Salts, and therefore are not by them introduced in so great plenty into the sanguineous mass, a salivation is not so promptly and surely excited by this Medicine.

This

This Medicine may be prepared after this manner more compendiously, and not less effectual. Part I.

Take purified Quicksilver, Oyl of Vitriol or of Sulphur alike ℥ij, being put into a Crucible first let all the humidity with a gentle fire evaporate away, then let it be urged with a stronger, that the calcined matter may be better fixed.

5. Aurum Vitæ.

5. *Gold of Life.*

Take of purified Mercury ℥v, of excellently purified Gold ℥ß: Let each of them be dissolved in their proper *Menstruums*, and the solutions put together, and all its humidity be done away by distillation in a Retort; let the remaining *Calx* be Calcined upon red hot Steel Plates, that the Salts may in a great part be done away, let the remaining matter be sweetned by washing with fair water, and Ascension of the Spirit of Wine.

6. *The* Hercules *of* Bovius.

The Hercules *of* Bovius.

This Medicine will be better prepared, if both the Metallick Bodies be dissolved in the same *Menstruum*, which by the Prescription of *Thomas Bovius* may be effected after this manner.

Take of calcined Vitriol, and of Nitre alike one pound, let them be distill'd in a reverberating Furnace, the Liquor being distill'd pour into the Glass Retort one pound of Sea Salt calcined, and draw it off by a gentle heat in sand, for it will very easily ascend; one part of this dissolves Mercury and the other Gold; then let both the solutions be drawn off together, and by frequent Cohobations adding every time about the third part of the same *Menstruum*, let the distillation be repeated until the matter be enough fixed, which being sweetned after the aforesaid manner keep it for use. The Dose is from *gr.* iij to vj or vij. (or)

Take of purged Mercury ℥iiij, of cleansed Gold ℥ß. make an *Amalgama* as is above shewed, to which being washed and put into a Retort, pour the aforesaid *Menstruum* of *Bovius*, let it be drawn off in a Sand Furnace, and with often Cohobations adding every time a third part of the same *Menstruum*; let the distillation be repeated until the matter be enough fixed, which calcine upon red hot Plates of Iron, and let it be sweetned by frequent washings and ascension of the Spirit of Wine. The Dose *gr.* iij to vj. It operates by Vomit not very violently, and for as much as it operates beyond the *Viscera* into the mass of Blood, it oftentimes gives help in very great Diseases.

As to what belongs to the Ætiology of this Chymical process, we say, whilst these two Champions striving together do mutually lay hold of and bruise one another, a third (and sometimes a fourth) coming upon them; binds them: Whereby they are more strictly complicated, and broken more minutely. But truly both the Gold by the Mercury, and both of them by the *Menstruums*, are dissolved and torn into little bits: then the Humidity being abstracted, the saline Particles of the Metals are combined with the Salts of the *Menstruum*. In the mean time the remaining metallick little bodies being cast between and shut up within the pores of the Salts. But yet this Combination is not so strict, but that the Metals by themselves or either of them by Solution and Coagulation with its proper *Menstruum*, may be reduced into precipitate: For indeed since that both the metallick Particles and the saline *Menstruums* in that prepared Precipitate, are so many and so diverse, all of them cannot be absolutely united. Wherefore that matter (as I have often observed) is not but very hardly fixed, and to be reduced into a *Calx* proper for Medicine; for if for the drawing off the *Menstruum*, too strong a heat be applied; the Mercury will ascend, and the remaining Gold resume its proper Species: But if the Fire be more remiss than it ought, the Combination of the Salts with the metallick Particles will not be strict enough, but that it will be taken away with mere ablution; so that common Water being poured on the Precipitate, it shall wholly dissolve it, and drink up the whole matter into it self, and then the whole Work must be well nigh reiterated for to make the Medicine.

The Reason of both the preparations.

Part I.

The ground of this Medicine is Mercury, by whoſe means it is expected, that its Particles ſhould ferment all the Juices of mans body, and remove the ſeparations of every heterogeneous heap both in the *Viſcera* and in the Veſſels. The Gold ſeems to be added for the taming the Mercury, and for breaking its too fierce and untamable Particles. Further, the Salts of the *Menſtruum* break either of the bodies into ſmall bits, and carry them more readily into the bloody Maſs, and into theſe more inward receſſes.

The Reaſon of the Hercules of Bovius.

In the diſtillation of this *Menſtruum* of both kinds deſcribed by *Bovius*, (by which both Metals are diſſolved) there happens notable encounters and decertations of the Salts as it were for Life and Death: For when the *Aqua fortis* is poured upon the prepared Sea Salt, it poſſeſſes its Earth and takes poſſeſſion, as it were, of its own ſoil, driving away from thence the Spirit of the Salt as it were ſet at liberty. This more clearly appears, if at any time the Spirit of Vitriol, being poured upon the Calcined Sea Salt, it be diſtilled, for that by a very ſmall heat of the Sand Bath; even the very pure Spirit of the Salt aſcends as an Exile, the Vitriolick *Stagma* invading its habitation. In truth theſe Salts are too little of kin, that they ſhould be combined together: Wherefore being put into too ſtreit a habitation; when they can neither be united nor cohabit; the ſtronger uſurping the Dominion expells the weaker out of doors.

The Reaſon of the Epicene Menſtruum of Bovius.

Chap. III.

Of the Remedy of too much Vomiting, alſo of Antiemetick Medicines, or ſuch as ſtop Vomiting.

NAture being incited to a violent motion, oftentimes goes beyond its bounds, and runs forth beyond meaſure, ſo that there is ſometimes need of a ſtop or *remora*, whereby its violence might be ſtayed. This is plainly diſcerned in vomiting, if at any time it be immoderate, through the operation of a medicine, or for any other occaſions; it therefore belongs as much to Medicine to allay this fury of the Stomach as to ſtir it up. How many ways, and for what cauſes Vomiting is wont to happen without taking an Emetick, we have already declared: Beſides it is obvious to common obſervation, that this evacuation provoked by Medicine is ſometimes ſo violent and ſo long, that unleſs it be ſtopped by the help of Art, Life it ſelf will be in manifeſt danger. Therefore as in the practice of Phyſick Emetick medicines are of neceſſary uſe; ſo ſometimes for the ſtopping that Excretion (as often as it ſhall be too much or preternatural) Remedies contrary to the former, or Antidotes for Vomiting are made known. We will therefore in the firſt place, ſhew how exceſſive Vomitings cauſed by an Emetick are cured: And then Secondly, by what means and remedies preternatural Vomiting, raiſed by reaſon of other Cauſes, may be helped.

Immoderate Vomiting proceeds either from an Emetick Medicine or from other Cauſes.

As to the firſt, Vomiting raiſed by a medicine becomes more vehement and continues longer, becauſe the animal Spirits being irritated beyond meaſure and growing angry; their diſorders are not eaſily or preſently remitted, but that they thruſting forth themſelves do by frequent fits ſtir up violent Emetick Convulſions, and often repeat them. Moreover that exploſive Force begun in the Ventricle, is not ſeldom propagated to the Spirits inhabiting the neighbouring parts, and from thence to others, and at laſt ſometimes to their whole *Syſtaſis*, in ſo much that Torments and Convulſions in the *Viſcera*, afterwards in the Midriff, and laſtly in the whole Body with manifeſt danger of Life follow Vomiting.

The Reaſons of the former are unfolded.

The Spirits are above meaſure irritated, either from the Medicine only by reaſon of the diſproportion of quality or quantity to them; or elſe from the other humours, as the like ſharp *ſerum*, and others being poured into the Ventricle in the time of Vomiting. Beſides in ſome the animal Spirits are ſo tender and Elaſtick,

that

that from every Emetick irritation though very light, both thoſe inhabiting the Ventricle, and thoſe alſo which are near about are excited into Convulſive Exploſions. Hence many enquiring from the Vomitory about the Milt, Paunch, and other inwards, impute the whole buſineſs to the Vapours ſtirred up by the Medicine, when indeed it happens altogether by reaſon of the Animal Spirits being readily too much moved, and hardly to be appeaſed.

Its Cure.

If this overworking be cauſed by the Medicine, let the Patient, being preſently put to Bed, make uſe of both external and internal remedies: And firſt of all that the Lodgers in the Ventricle may be quieted; let there be adminiſtred either a fomentation warm, of the Decoction of Pontick Wormwood, Mint, and Spices in red Wine, or a Cake of a piece of bread toſted, and dipped in Claret Wine warmed, applied thereto. Let there be a Gliſter given of Milk with Treacle diſſolved therein: Let alſo warm Frictions of the members be uſed, and ſtrong Ligatures above the Knees which may drive away the Convulſions from thoſe parts. Let the Ventricle in the mean time be kept empty, unleſs ſwooning follows: But as ſoon as he may be able to take any thing of food or medicine, let him have ſome Cordial water or warm burnt wine. In very great perturbation, if the Pulſe admit it, Treacle Andromick, or *Diaſcordium*, alſo ſometimes a ſolution of *Laudanum* or Opiatick Tinctures are convenient.

Vomiting from other Cauſes is either Critick or Symptomatick.

In preternatural Vomiting ſtirred up from other Cauſes, we muſt conſider whether it be Critick or Judicial, or Symptomatick Signal. In the former there is nothing to be done ſuddenly or raſhly: that ſuperfluity whilſt they have ſtrength, may not be ſtop'd, but the going forth of the matter to be expelled is either to be facilitated or haſtned, or to be carried forth by ſome other way. Hence being urged by a nauſeouſneſs and ſtriving to vomit; it is convenient to give Poſſet-drink ſimple or with the leaves of *Carduus* boyled therein, alſo ſometimes *Oxymel*, and wine of Squills or Antimonial Wine. Sometimes Glyſters are uſed, and ſometimes alſo a gentle purge carries away the matter, boyling in the Stomach by a more eaſie way of excluſion through the Inteſtines.

The latter is either Idiopathick or Sympathick.

(2.) In Symptomatick Vomiting a conjunct cauſe (as we have already intimated) either ſubſiſting in the Ventricle, produces that Idiopathick or proper Affection; or fixed in other parts ſtirs up their Convulſions, and a Communication being made by the Nerves, the Emetick perturbations in the Ventricle, as in the Nephritick Paroxyſms, Colicks, Hyſterick paſſions, Vertigo and many others uſe to happen, the healing of which ſort of Sympathick Vomiting, depends upon the cure of the primary Diſeaſe.

When the Stomach is primarily affected what method to be uſed.

When the Stomach is primarily affected, the Cauſe is, that the Nervous Fibres irritated above meaſure, provoke the other motricious Fibres into excretory Convulſions. But theſe are irritated from an improportionate Object, *viz.* In as much as they are not able to thruſt forth to the Inteſtines or to overcome, or to digeſt rightly a certain matter which lies upon them, but are neceſſitated by exciting Vomiting to caſt it the ſooneſt way out of doors. That Matter beomes ſo incongruous or untamable by its own proper vicioufneſs, for as much as offending in quality or quantity it provokes the Nervous Fibres; or by the fault of the Stomach it ſelf, becauſe that its tone is lax, and its Fibres becomes ſo weak, that they cannot be able to overcome or tolerate the Chyle it ſelf, much leſs the excrementitious humours, but that being impatient of its burthen, they caſt forth whatſoever is contained within by Vomiting. As there are various cauſes of either of theſe, and manners of affecting, we will here ſhew ſome of the chief of them, together with the Remedies and the reaſons of the Cure.

The Emetick matter ſubſiſting in the Ventricle is either poured into it from another place, or is begot there by reaſon of its depravity or want of Concoction: in either reſpect the preſent Ballaſt is firſt of all to be carried forth, then its more fruitful increaſe muſt be cut away, or provided againſt.

Therefore that the filthy *Colluvies* of the viſcous matter may be cleanſed out of the Ventricle; let there be preſcrib'd a gentle Vomit, of *Carduus* Poſſet-drink, or of *Oxymel* or Wine of Squills or of the decoction of the Flowers of Camomil, or of the Roots of Agrimony with the ſolution of the Salt of Vitriol or ſuch like, then the Reliques may be gently carried off by Glyſters or Cathartick either by the Pills of Maſtich: Stomach Pills with Gumms, or ſacred Tincture or with the Infuſion of Rhubarb. Moreover when the impure rank Blood

heaping

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heaping up anon a new proviſion of incongruous Matter oftentimes flowing into the Ventricle either through the Arteries, or the Choler-carrying Veſſels, brings in an emetick Diſpoſition. Blood letting doth not rarely give help, and therefore the Vomitings of great bellied Women are frequently cured by this kind of Remedy. Beſides thoſe things are convenient which may attemper the Blood, whereby the leſs aduſt Excrements may be therein generated. Hence it is that Whey, the drinking of medicinal Waters, the Juice of Herbs, *Sal Prunellæ* and ſuch like for as much as they ſcatter the Blood, and carry its Excrements to another place, they often take away the Vomitive Diſpoſition. Theſe kinds of remedies are likewiſe uſed if that frequent and daily Vomiting, proceeds (according to the opinion of ſome) from the meeting and wreſtling of the biliary and pancreatick Humours, and their regurgitation into the Ventricle.

The frequent Vomiting and the hardeſt to be cured is that which proceeds from an incongruous Matter begot within the Ventricle, and from thence becomes Emetick, for as much certainly as by reaſon of the vitiated Ferment of this *Viſcus*, whatſoever is eaten, degenerates into an irritative putrefaction. Wherefore in this caſe, after that the filth of the Stomach is cleanſed by a gentle Evacuation, they are wont to make uſe of remedies commonly called Digeſtive; which, even as the fermental Juice of the Ventricle, being very much of a ſaltiſh diſpoſition and ſometimes alſo of a ſulphureous, ſhall be in a various ſtate of Fixation, flowing or aduſtion, conſiſt after a divers manner, and are rather helpful now this way now that way.

The Vomiting proceeding from the Ventricles being Vitiated how to be cured.

In Belching, and acid Vomiting, theſe following Medicines may be tryed, and the Rule of the Method to be relyed upon may be choſen out of the things that bring help.

Remedies againſt the too much acidneſs of its Ferment.

Take of the Powder of *Ari Compoſ.* ʒiſs, of the Salt of Wormwood ʒij, of the Sugar of Roſes ʒiij, make a Powder, give of it in the Morning and at five a clock in the afternoon, ʒj in a little draught of Ale boyled with Mace and a Cruſt of Bread or in diſtilled Water or Tincture of Roman Wormwood.

Take of the Powder of Ivory, the Eyes of Crabs, of red Coral alike of each ʒij, of calcined Coral ʒj, of red Sanders, Cinnamon *ana* ʒſs make a Powder, Doſe ʒſs after the ſame manner.

Take of *Lignum Aloes* of yellow Sanders, of the Bark of Mint, of each ʒij, of white Chalk ʒvj, Sugarcandy ʒſs, of the ſolution of Tragacant, of the Water of Mints, make a Paſt, and let them be formed into Troches of ʒſs weight, let him eat iij or iiij thrice or oftner in a Day.

2. Againſt its Ferment being too ſour.

Take of the Tincture of the Salt of Tartar ʒj, the Doſe is ℈j to ʒſs, twice a Day in ſome proper diſtilled Water.

2. In ſour Vomiting, Medicines endued with a warm, ſharp, vitriolick Salt are more convenient,

That famous one of *Riverius* in this caſe is the chief.

Take of the Salt of Wormwood ℈j given in a ſpoonful of the Juice of Limons.

Take of prepared Coral ʒij, of the Salt of Wormwood ʒiſs, of the Juice of Limons ʒiiij let them ſtand in a larg Glaſs, add to them of the ſtrong Water of Cinnamon ʒij. The Doſe is a Spoonful or two twice a Day, the Glaſs being firſt ſhaken.

Take of Ivory, Coral, of each ʒij pouder, of the Vitriol of Steel ʒj, of Sugar-candie ʒj mingle them, and divide them into 6 or 8 Parts, of which take one part twice in a Day in ſome convenient Vehicle.

3. Againſt the Stomach being to bitter.

In this caſe purging mineral Waters which have much Nitre in them, alſo your Iron tinged Waters and indeed our artificial Chalybeates are wont to give notable help.

If at any time the Stomach perverting the moſt part of what is put into it to a bilious and bitter Rottenneſs (as it often is wont) and for that reaſon is prone to frequent Vomitings, then both ſharp, and alſo bitter remedies are convenient.

Take of *Elixir Proprietatis* ʒj, the Doſe ℈j twice in a day in ſome fit Vehicle.

Take of Rhubarb Powder *gr.* xxv, of the Salt of Wormwood ℈j, of the Water of Cinnamon ʒſs, of the Juice of Lemons ʒj, mingle them, take of it by it ſelf or mixt with ſome other Liquor.

Take

Take Powder of *Ari Compos.* ʒiſß, of Tartar Cryſtalized ʒiij, of the Vitriol of Steel ʒj, of Sugar ʒſß, make a powder; the doſe is ʒß, or ℈ij every Morning drinking after it a draught of the tincture of Pontic Wormword or Coffee. Part I.

Take of the Powder of Crabbs Eyes ʒß, of the Chalybeate Tartar ʒij, of Sugar-Candie ʒj, make a Powder; the Doſe ʒß in a fit Vehicle twice in a day.

Oftentimes the cauſe of a frequent and habitual Vomiting is not ſo much the matter irritating the Ventricle, as the debility of its nervous Fibres, and their too great propenſity to irritation; for that they are ſo tender or infirm that they are not able neither to Concoct what is taken in, nor to ſuffer the weight or burthen of them, but that they are preſently irritated by any thing lying upon them, and therefore to expel what is ſo troubleſome, they provoke the fleſhy Fibres into Emetick Convulſions. *Vomiting from the debility of the Ventricle.*

There are two principal Cauſes of this kind of Affection; *viz.* either the debility of the Stomach is in the Fibers themſelves contracted by inordinate paſſions, as ſurfeiting too often, and immoderate drinking by too frequent taking of Wine or ſtrong Waters, and by other inordinacies of eating and drinking, ſo that theſe Fibres, for as much as they are beyond meaſure diſtended, or made too hot and as it were roaſted, are not able to admit or contain the animal Spirits in enough plentiful abundance: Or ſecondly theſe Fibres although they may be well enough of themſelves, yet for that the Nerves are in ſome other place obſtructed, they are deſtitute of the due afflux of Spirits, and from thence being languid and flaccid, they are not able to bear what is taken in, but preſently being aggravated, they endeavour to caſt it forth by Vomiting: ſo I have known many without any impurity of the Ventricle, or *Languor* contracted through irregularities, affected with a certain kind of palſie of that *Viſcus*, to have wanted appetite, and to have been obnoxious to aſſiduous Vomiting. *Of which there are two cauſes.* *Or the tone of the Fibres is decay'd.* *2. Or there is a defect of Spirits by reaſon the Nerves are obſtructed.*

In the former Diſeaſe thoſe kind of remedies are preſcribed, which may cauſe the too much diſtended and tenuated Fibres to wrinkle themſelves and to be contracted into a ſhorter Space; alſo ſuch as may allure thither more copiouſly the Spirits by their grateful uſage, and cheriſh the Languid. *The cure of the former affection.*

Take of the Elixir of Vitriol of *Mynſichtus* ʒj; the Doſe is from 10 drops to 15 twice or thrice in a Day in a ſpoonful of diſtilled Water, drinking 7 or 8 ſpoonfuls of the ſame after it.

Take the tops of Cypreſs vj handfuls, of the Leaves of Clary iiij handfulls of exterior Barks of Orange 12, Cinnamon, Mace of each ʒj, of the Roots of Galingal the leſs, and of Cypreſs of each ʒß; being ſliced and bruiſed let them be put into viij ℔ of *Brunſwick* Beer and diſtilled in an ordinary Still.

Take of the Tincture of Tolutan Balſom wtih the Tincture of the Salt of Tartar extracted ʒj, Doſe 20 *gr.* with the ſame Vehicle, the Tincture of Wormwood prepared with the ſame *Menſtruum* may be tryed.

Take of the Powder of the Flowers of Wormwood, of Mirtle dryed in the hot Sun, of each ʒij, Cinamon, Flowers of red Roſes of each ʒj, Cubebs, Roots of Galingal the leſs of each ʒß, of red Coral broken ʒj, make of them all a ſubtle Powder, then with ʒvj of the whiteſt Sugar diſſolved in Cinamon Water and boyled up to a Conſiſtency make of them all Tablets each weighing ʒß, eat one or two as often in a Day as you pleaſe.

Take of the Conſerve of red Roſes vitriolated ʒiiij candied Myrabolans ʒij, Ginger candied in the Indies ʒß, *Species* of Hyacynth ʒij, of the reddeſt *Crocus* of Steel ʒj, Syrrop of Coral what will ſuffice, make thereof an Electuary the Doſe ʒj, twice in a Day drinking after it a little draught of diſtilled Water,

2. In the debility or reſolution of the Ventricle by reaſon of the Nerves being ſomewhere obſtructed, Antiparalytick Remedies joyned with Stomachalls are of chiefeſt uſe. *How the Palſie of the Ventricle is to be cured.*

Take of the *Elix. Proprietatis Tart.* ʒj, the Doſe ℈j, twice in a Day with

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with the Water above preſcribed, The Tincture of the Salt of Tartar, of Coral, of Antimony, may be made uſe of after the ſame manner. In this caſe alſo the ſweet Spirits of Salt, the Spirit of *Sal* Armoniac or its Flowers do give notable help. Beſides Vomitories and Purges, and even Diaphoreticks are oftentimes ſucceſsfully adminiſtred. I have known this Diſeaſe ſometimes happily cured by bathing in our Baths of *Bathe*.

SECT. III.

SECT. III.

CHAP. I.

Of Purging and of purging Medicines.

PUrging ſeems to be an Affection contrary to Vomiting, or rather inverted; for truly in this and in that, they run from the Priſons of the ſame Ventricle, to a divers Goal. For even as in Vomiting the interior fleſhy Fibres of the Stomach being inflated by the ſudden running in of the Spirits into their left Ends, and ſo being contracted they make its bottom and ſides to be drawn together, and to be brought upwards towards the left Orifice, to the end that its Contents may be carried forth above: ſo in purging, the ſame fleſhy Fibres being in like manner inflated at their right ends, and contracted, they cauſe the whole circumference of the Stomach to be gathered together, and to be inclined towards the *Pylorus*, that the Excrement may paſs away by the inferior Parts. As the excretory Motion begun from the Ventricle is continued by the *Oeſophagus*, ſo it is in purging by the Inteſtines, and either of them is propagated by the fleſhy Fibres from part to part to the end. In either affection the motion of the Stomach is violent, and after a manner convulſive, ſo that ſometimes either is changed into the other. For purging being too much haſtned from a ſharp Provocative, oftentimes cauſes Vomiting: in like manner purging of the Belly follows from an emetick Medicine: the reaſon of which is, becauſe the animal Spirits being vehemently irritated, and thruſt forth, they leap diverſely ſometimes into theſe and ſometimes into thoſe ends of the fleſhy Fibres; almoſt after the ſame manner as if you ſhould too much urge a generous Horſe with your Spurrs, you will force him ſometimes to run forward, and ſometimes to leap backward.

Purging in an affection contrary or Inverſe to Vomiting.

Therefore Purging is an excretorie Motion in the Ventricle, and in the Inteſtines, by reaſon of their fleſhy Fibres being ſwiftly and orderly contracted quicker and faſter whereby the Chyle and its *Fæces*, both the recrements of the Humours, or the Corruptions there begotten, or pour'd in from another Part, may be thruſt on from one part unto another until they be caſt forth a doors at the Fundament as thorow a Sink. For the Ventricle being irritated by the prickings of the Cathartick, contracting it ſelf quicker and more ſtraitly towards the *Pylorus*, pours forth whatſoever it cheriſhes in its Boſom, into the *Duodenum*; and the Inteſtines being pulled together, they reiterate greater and more frequent excretorie Spaſms, by which moſt of the Contents before heaped up in their Cavities, or attracted, or expreſſed at that time, are excluded. Alſo Purging is that ſort of violent and conſtrained Excretion, which Nature being quiet performs at leaſure and at times; in ſuch Nature being provoked, acts not without tumult and a certain perturbation. Therefore for the more perfect knowledge of Purgation it ſeems requiſite, that firſt of all we ſhould ſhew what are the Contents of the Ventricle aud the Inteſtines, both their proper, and thoſe ſuggeſted from another place, which are wont to be ſent forth by Stool. Then theſe being effected, it will be reaſon to explicate by what means, and by what ſtrife purging Medicines do perform their Operations.

Its Deſcription.

1. As to the firſt, the chief Contents of the Ventricle and Inteſtines are the Chylous Maſs, and its remaining *Fæces* after the diſtribution of the nutricious Juice, the filth of theſe Inwards ſmeering the hairy Cruſt, and Water ſticking in

The Contents of the Ventricle and the Inteſtines which purging Medicines carry forth.

Part I.

in its Glandulaes; with which go a ſerous water flowing from the mouths of the Arteries, as alſo the Recrements of the blood and humours, which by the Choler carrying Veſſels, the Pipe of the *Pancreas*, the mouths of the Arteries, and alſo by the extremities of the nervous Fibres, and by other ways perhaps, are poured into their interior Cavities. For thorow the inteſtinal Pipes, as it were through a ſink, the whole impurity of the Body is wont not ſeldom to be purged forth; which indeed if reſtagnating within, they either puff up through their plenty; or being imbued with ſharpneſs, by making ſlippery, or by ſtimulating the Belly they provoke to very frequent and plentiful Stools.

The chylous maſs, the remaining fæces, *muck, water, and* ſerum *abounding in the Glandulaes and Arteries.*

Beſides theſe kind of Contents there is yet another reſulting from theſe, *viz.* Winds, which are wont to be ſtirred up within the Stomach, and the Cavities of the Inteſtines more than in any other part of the whole Body, and ſeem to be produced after this manner: Whilſt that the Aliments being conſtrained in the Bowels, and digeſted, are diſſolved by their ferments and heat, very many *Effluvia* come from them, which if they might obtain an open and free ſpace, would vaniſh away going into the Air, but they being ſhut up within a membrane, and gathered together; they conſtitute an heap of Vapours as it were wind: which oftentimes blows up and diſtends the Inteſtines, and which, way being given, ruſhing out, moves along with it excretions: But being ſhut up creates torments, and not rarely an inflation of the belly. Winds ariſing from the diſſolving of the Aliments in the Bowels, are begot after ſuch like manner, as when Pearls, Corals, or other Concretes being put into a Matrace are diſſolved by their *Menſtrua*: For very many vapours ariſe from their ſolutions, which if they are ſtraitly kept in, will enforce the Veſſel that contains them to fly or break to pieces. In like manner from the diſſolution or concoction, or fermentation of the Aliment within the firſt paſſages, very copious *Effluvia* ariſe; which being gathered together and ſhut up within the Membranes become wind: to whoſe more plentiful increaſe ſome other cauſes do contribute. For the colluctation and efferveſcency of Juices not rightly mixed do notably perform this: For that whilſt the adventitious humours, or heterogeneous things heaped together, and chiefly Medicaments do ferment with the other contents of the Inteſtines, from the mutual refraction of Particles very many little bodies proceeding, they are gathered together into a Vapour. Moreover from the blood it ſelf bubling up, when as a copious breath every where flows out, ſome part of it breaking forth from the Arteries into the cavities of the *Viſcera* doth there increaſe the produced heap of Blaſts. But further yet, the extenſions of the *Viſcera*, and their Convulſive Intumeſcencies, add to the more plentiful heap of Winds: For whilſt the Membranes by reaſon of the exploſions of the Spirits, and their inordinate excurſions, are very much diſtended; the internal Cavity as a blown up bladder is much enlarged, by reaſon that a portion of the included humour within that vacuity, as it were a Cucurbit after the fire is out, is rarefied into wind; which afterwards when the ſtiffneſs of the Membrane gives way, breaks forth with a force, or paſſes through the neareſt windings of the Inteſtines tumultuouſly. For this reaſon, when any part of the Inteſtine by an inflammation, or falling down of ſharp humours, ſhall be obnoxious to convulſive ſtretchings forth, alſo Winds continually brought forth become very troubleſom. When I have opened the dead bodies of many dying of an inflammation in the *Colon*; I found in all of them their whole Inteſtines diſtended to the utmoſt, and as it were blown up with Wind: Which without doubt happened, not becauſe the Wind firſt begotten had diſtended thoſe *Viſcera*; but when from the ſpirits of the Membrane greatly irritated, and thruſt forth among their Fibres, they ſhould be very much diſtended; therefore thoſe Blaſts were begotten to fill up the *Vacuum*, and ſo by conſequence ſecondarily. From this cauſe we have formerly intimated the Tympany to ariſe, as, in another place, perhaps we ſhall ſometime or other more largely declare. As therefore there is wont to be a very plentiful ſtore of Winds in the Stone or Gravel, in the Colical, Hypocondriacal, and Hyſterical paſſions, they are not, as 'tis commonly thought, the cauſes of thoſe Diſeaſes, but only the effects. Indeed whilſt by the Paroxyſms of thoſe Membranes the irregular extenſive Affections ariſe, and that the hollow *Viſcera* do ſwell up by the Spirits violently running forth, from hence preſently, that the empty ſpace may be filled, a certain humidity being ſhut up, is reſolved into vapours, from which the blaſts ariſe. Wherefore when the diſtention of the affected part is relaxed,

2. *Wind.*

How winds are begotten within the Cavities of the Bowels.

Blaſts are ſometimes the Cauſe and ſometimes effects of the Extenſions in the Viſcera.

After what manner the winds in Cramps are wont to be begotten.

laxed, the Wind ſo ſuddenly produced is driven to ſome other place, by the falling down of the Membranes. So much concerning the Contents of the Ventricle and Inteſtines, which are the objects of cathartick Evacuation. Now, which next belongs to the ſame ſubject, let us enquire what the motion is of thoſe *Viſcera*, whereby theſe Contents being either leiſurely carried along, are ſent forth at their due times; or elſe being haſtily thruſt on, they are caſt out by heaps.

Part I.

How the natural excretory motion of the Inteſtines is made.

Becauſe for the conſervation of Life living Creatures ought to be repaired by often and plentiful feeding; there is a neceſſity therefore that the Aliment ſupply with nutricious juice the continual decays, and that the Reliques be timely removed, ſo that the old leavings of the Chyme may give place for new Proviſion. For after that a portion of the Chyle (in which the Elements being perfectly looſened, are freed from the bond of mixture) more pure and elaborate is preſſed forth into the Chyle-carrying Pipes, what remains participating with the pricking Salt of a more thick Sulphur, contracts a moſt grievous ſtink: Wherefore it ought to be removed from the vicinity of the freſh chylous Maſs, into the thicker Inteſtines, and at length wholly out of the Body. Whereby theſe things may be the better affected, Nature gives to the Inteſtines an almoſt conſtant, and as it were, ſolemn excretory motion, aud conſtitutes various incitements or provocatives to that motion.

By what Fibres it is effected.

1. As to the firſt, the excretory motion of the Inteſtines, as of the Ventricle, is effected altogether by the fleſhy Fibres, compoſing the middle Coat of either of the *Viſcera*, and we have taken notice of a double order or *ſeries* of them in the whole paſſage of the Chyle, to wit, from the *Oeſophagus* to the ſtreight Inteſtine. The exterior order indeed of the inteſtinal Fibres, are ſtretched in length through all thoſe *Viſcera*, and ſtrait upon the whole ſuperficies; but the interior *ſeries* or order, conſiſts in circular Fibres compaſſing about on every ſide, as it were ſet thick with little Rings, the pipes of the Inteſtines; as it is repreſented in the third figure of the ſame Table. The Fibres of either kind being contracted together, do ſtraiten the Cavities of thoſe Inteſtines through all their dimenſions: which whilſt it is done ſucceſſively and by one order after another, and as it were by jumps, there is a neceſſity that whatſoever is therein contained, ſhould gently and even creepingly be carried along, the forepart being even thruſt forward by the following part. This ſort of motion of the Inteſtines is commonly called Vermicular, becauſe it is continued from one part to another as in a creeping Worm; and is continually acted according to the uſe and needs of Nature more or leſs, without alſo our knowing of it; becauſe indeed theſe *Viſcera* ought to move away their burthen very leiſurely: But leſt that ſometimes they ſhould, being idle, deſiſt from this task, they are urged as occaſion ſerves by divers provocatives.

By what provocatives the natural excretory motion is urged.

1. By the burthen and trouble of the fæces.

For in the firſt place the heap it ſelf of the Chyle and the *Fæces*; aggravating and ſo irritating with its weight the nervous Fibres of the interior Coat upon which it leans, impreſſes upon them a certain ſenſe of the trouble, and thence preſently as ſoon as they are filled with the nutricious Juice, and now growing weary of the reſt of the Burthen, they inſtigate the fleſhy Fibres to vermicular Contractions, for the further moving away the Contents. When by this means the Contents of the Belly being leiſurely one part after another thruſt forward, do deſcend near to the end of the *Colon*, becauſe then the muſculous part of the right Inteſtine feels a preſſing; therefore the voluntary comes in the room of the natural Motion, whereby the *Sphincter* of the Arſe-hole being opened, and the Muſcles of the *Abdomen* being compreſſed, the Excrements are caſt forth of the doors. Moreover the Organs of Reſpiration do contribute ſomething to this excretory motion of the Inteſtines, for that indeed they perpetually drawing here and there up and down the inferior Belly, whilſt they ſo ſhake its contents, they make them to move gently forward.

Beſides the aforeſaid irritation, by which the fleſhy Fibres by the inſtinct of Nature, and by an ordinary way are provoked into frequent and almoſt continual Vermiculations, there happen yet ſome other provocatives and various incitements, which conſtrain or haſten as occaſion is offered, thoſe excretory Contractions, and not ſeldom compel them into compulſive; ſo that the Belly is forced to caſt out its contents haſtily and impetuouſly, as if they were provoked by a Cathartick. But theſe intrinſick irritaments of the Belly are in the firſt place incon-

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gruous or immoderate food, Corruptions of degenerate Chyle, plentiful excrements of the Blood and nervous Juice, or ſharp overflowings out of the Glandula's and other Emunctories of the *Viſcera*, and chiefly from the receptacle of the Gall and Pipe of the Pancreas, as alſo ſeroſities, or ſuperfluous humours or incongruous flowing from the Blood and from the ſtock of the Nerves, and from the inward diſpoſition of the Body. Concerning the chief of theſe, becauſe they ariſe oftentimes in purging, and do intend the operation of the Medicine, we will ſpeak ſpecially and briefly.

To which happen many accidents of other things.

Incongruous food or depraved in the Concoction.

In the firſt place therefore, Aliments, if at any time they are perverted in their concretion, or will not be overcome, they do not ſeldom cauſe a *Diarrhœa* or lask, as it often happens in a ſurfeit, inordinate feeding, from unagreeable meats and other errors in Diet, or from the depravations of the ferment of the Stomach. Yea by reaſon of want of digeſtion, ſometimes alſo through obſtructions in the Meſentery or inteſtinal Pipe, by reaſon of too much viſcouſneſs ſticking upon the glaudulous Coat or mouths of the Veſſels, that hinders the diſtribution of the nutricious Juice, and therefore the whole matter almoſt of things eaten, being retained in the firſt paſſages, produces frequent and plentiful Stools.

2. Choler and the pancreatick juice.

2. The excrements of the Blood and of the nervous Juice, being heaped together in the glandula's of the *Viſcera*, the bag of the Gall, the pipe of the Pancreas, and perhaps in other receptacles; if at any time they flow over through plenitude or irritation; they are abundantly thruſt down into the cavities of the Inteſtines, and in as much as they there pull or hawl the nervous Fibres, and with other Juices grow hot, they oftentimes produce a *Diarrhœa*. It ſeems the yellow Choler is as it were a kind of natural Cathartick, which plentifully flowing forth of the Choler-carrying Veſſels moves a ſpontaneous purging.

3. Humours from Blood, nervous juice from their Viſcera, and habit of the Body being tranſlated to the Inteſtines are carried away by Stool.

3. An excremental matter from a yet more remote Region, to wit, either from the maſs of the Blood, or from the nervous Liquor and its emunctories; or from the whole habit of the Body, being ſometimes tranſmitted to the Inteſtines, irritates their nervous Fibres, and from thence ſtirs up the fleſhy Fibres into excretory Convulſions. For in the aforeſaid parts and places, and chiefly in the bloody Maſs, the degenerate or ſuperfluous humours ariſing up, when they are not eaſily or ſufficiently to be ſent away by evaporation or piſſing, ofttimes a *Metaſtaſis* being made within; they overflow thickly every where from the gaping mouths of the inteſtinal Veſſels, cauſing very frequent and watry Stools. And truly ſometimes the Blood it ſelf, being vitiated into a thickneſs and apt to coagulate; when it cannot be circulated readily through theſe ſmall Veſſels, frequently breaks forth in great abundance, and cauſes a dyſentery or bloody Flux. But it is to be obſerved, when the exterior Pores are ſhut up by cold, or the skinny tumours do ſuddenly vaniſh, a flux of the Belly ſucceeds. I have known many obnoxious to a conſtipation of the Belly, to have been cured by this kind of Remedy only; to wit, that they aroſe from Bed betimes in the morning, an hour ſooner than they were wont. For how much the accuſtomed perſpiration is leſſened, ſo much is added to make ſlippery the Belly. Theſe things being thus premiſed concerning the various Contents of the Inteſtines, both thoſe inbred and acceſſory; and alſo concerning the excretory motion of theſe Inwards, both natural and ordinary and both violent and conſtrain'd, alſo concerning the various provocatives or irritations, by which the Belly by the accord of Nature is wont to be moderately looſed or more inordinately diſturbed: It will be eaſie to ſhew by what means, and by what kind of ſtrife purging Medicines do move the Ventricle and Inteſtines to excretions, and cauſe their contents to be carried forth, now theſe, now thoſe apart, and ſometimes many together.

How Cathartick's bring away the Contents of the ſame Viſcera.

By what means theſe do work in a liquid form and how in a ſolid.

By what order now on theſe parts now on thoſe.

When purging Medicines are taken in a liquid form, they are already enough prepared for the work, but if they conſiſt of a ſolid ſubſtance, being taken into the Ventricle and diſſolved by its ferment and imbued; they make, as it were, a tincture which becomes a Cathartick; purging after the ſame manner as the Liquor, according to the following means and reaſon. It ſeems that this kind of liquor, being firſt of all ſhut up in the Ventricle, and afterwards in the Inteſtines, by and by imbues the hairy filaments of the interior Coat with the Glandula's, and whilſt it adheres cloſely to them, its Particles enter into the nervous Fibres, and both ſanguiferous and Chyliferous Veſſels, and irritate every one of theſe and alſo the Choler-bearing Pore and pipe of the Pancreas to make them render their Contents,

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Contents, and as it were to ſpue them forth. In the mean time the nervous Fibres of the interior Coat are hauled partly by the imbibed Medicine, and partly by the Humours preſſed forth into its Cavity, the fleſhy Fibres of the ſuperior Coat begin the Excretorie Convulſions, whereby that which is troubleſom might be removed. By what means theſe are done firſt in the Ventricle, and then ſucceſſively in the parts and in what parts of the Inteſtines, and what ſort of Humours are picked forth in the whole Paſſage, we will a little more accurately conſider.

1. As to the Stomach it ſeems to be done after this manner following, *viz.* The Cathartick Tincture being diffuſed within the Stomach, it firſt of all imbues the hairy Raggs of the inward Coat, and adhering very cloſely to them, from thence it is delivered to the nervous Fibres, entring into which and quickly filling them even to ſaturity, at length it begins to irritate them; who therefore preſently wringling themſelves endeavour to put away the imbibed Liquor together with its proper Juice, and the viſcous Phlegm laid up in the folds of the Stomach. Further certain other Particles of the ſame Medicine, while it ſtays in the Stomach, enter into the Mouths of the Veſſels, and *Glandulas*, and pull them, and cauſe the Seroſities in them and other Humours to be wrung forth, and emulged. And whilſt that the Bottom of the Stomach and the nervous Fibres are ſo grieved and provoked by theſe kind of troubleſom Contents, the fleſhy Fibres being ſtirred up into excretory Contractions, they draw together the bottom and ſides of the Stomach upwards and incline them towards the *Pylorus*; that its loading with the medicinal Tincture might be caſt forth adoors, and be tranſmitted to the Inteſtines. After that the Stomach for a little while obtains a ſedation and quiet reſt, until that the nervous Fibres drinking in a new proviſion from part of the ſame Tincture ſticking ſtill to the hary Filaments are again irritated; and ſo as a new loading is moved and expreſſed into the hollowneſs of the Stomach, the fleſhy Fibres repeat again the excretory Convulſions for its caſting forth, and this is ſo acted by turns until the Poyſon of the Medicine be wholly purged, and wiped clean away from the hairie Raggs, and that the Spirits inhabiting the Fibres lay aſide their angers; which ſometimes quickly and eaſily ſucceeds, ſo that after an Hour or two the Stomach is free from any trouble impreſſed by the Medicine, the remaining perturbation being altogether tranſlated to the Inteſtinal Region. But yet it very often happens, from a Cathartick being taken, that ſhort but very ſharp Vomitings are excited, and nevertheleſs though the Medicine be caſt up, that a Purging plentiful enough follows. The reaſon of which is, for that too great and violent an irritation being made at the beginning, it ſtirr'd up more ſtrong, that is, emetick Convulſions; then after that the force of that irritament was leſſened or broken, the contractions became more gentle and Cathartick. For truly, the Virtue of a purging Medicine and of a Vomit, and the manner of their Working, differ not ſo much as to their ſpecifick qualities, as chiefly in this reſpect, that the trouble given by the irritation of that is more eaſily and longer to be tollerated, that it may at length be tranſmitted to the Inteſtines, but not that which is excited by an Emetick. But that ſometimes Vomiting ariſes, after the operation plentifully made by Stool, the cauſe ſeems to be, that the Tincture of the Medicine, being more deeply imbibed by the hairy Coat, is not eaſily wiped off; wherefore after very many purgative Endeavours had in vain, at length an Emetick Convulſion is ſtirred up for the thorowly ſhaking it off. It is a uſual thing for the Stomach before it be emptied by a Medicine, to be ſtirred up to Vomit by things taken in with notable nauſeouſneſs and trouble, becauſe indeed the Chyle by reaſon of an hindred or depraved Concoction degenerates into an incongruous and irritative putrefaction. But that the moſt part of the purging Medicine ſlides away too ſoon out of the Ventricle, and without cleanſing away its fliths, ſpending its greateſt ſtrength within the inteſtinal Pipes: by what means this is done we will ſee next.

1. what their action is within the Ventricle.

To wit, in the firſt place they move the nervous Fibres into a Senſe of the Trouble, then the moving Fibres into Excretory Convulſions.

whence the frequent change of theſe Motions proceed.

The Cathartick Tincture being thruſt forth of the Stomach, and carying with it from thence a certain excrementitious matter, ſlides into the Inteſtines; where it imbues preſently in the paſſage of the *Duodenum* and the ſuperior *Ilion*, the Filaments or Raggs of the hairy Coat, and ſticks cloſely to them: then the

The operation of the Carhartick within the Duodenum *and ſmall Guts.*

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the medicamental Particles being plentifully poured upon the nervous Fibres, they alſo enter into the Pipes of the Glandulaes and of other Veſſels, and irritate the Spirits inhabiting them, and when they begin to wax hot with the Humours there abounding, they compell them as it were to be milked or preſſed forth from thence, and ſo they ſtir up a great perturbation in them all; wherefore the fleſhy Fibres being inflated and contracted by the irritated Spirits, and agitating into Exploſions, fall into excretory Convulſions, for the ſhaking off that trouble. Hence when the ſuperior Region of the Inteſtinal Pipe is provoked into frequent and ſtrong Vermiculations, whereby the Contents might be driven further off, that motion of Excretion being begun is propagated to the reſt of the Inteſtines, and thoſe together being ſtimulated by the Contents of the Superior being thruſt forth into their Cavities, fall into excretory Convulſions one after another, untill the *Fæces* of the Belly which ſtay laſt of all be thruſt forth of Door, others and then others coming in their places. The Cathartick Tincture as if infeſted with Spirits, irritates the nervous Fibres (as it hath been ſhown) into Corrugations, and dolorous extenſions oftentimes, and the fleſhy Fibres into Excretory Convulſions: then for as much as the ſame begins to ferment with the Humours, and the Contents of the Inteſtines, an Ebullition being made within their Cavities, and Blaſts ſtirred up, it variouſly blows up, and diſtends the conteining Membranes, and ſo cauſes the unloading of the Belly with wringing pains and with a noyſe.

The action of the Cathartick on the biliarie and pancreatick Pore.

Whilſt that the nervous and fleſhy Fibres are provoked into ſuch ſenſible trouble by reaſon of the Spirits being irritated by the cathartick Tincture, and into excretory Convulſions, alſo the biliarie and pancreatick Pores being pulled and ſhaken, put forth their Humours, and as it were ſpew them forth out into the Cavities of the Inteſtines: both of which being poured abroad and eſpecially more copiouſly from the Bile, the membranes being irritated as much as by the Medicine it ſelf, they are urged into frequenter and ſtronger Excretions; and ſo when the ſtools are tinged by the yellowneſs of that Humour, it is ſaid commonly (though falſly) that the yellow Choler is pick'd forth and peculiarly brought away by the Medicine. If that the Humours poured forth from theſe Pipes do mutually grow hot, and as ſome think do ſtruggle one with another with a notable Orgaſm or violent Appetite; for that a yet greater perturbation with a turgency of Humours, and Blaſt of wind within the Cavities of the Inteſtines, will be ſtirred up.

Alſo what it is on the Glandulaes and Mouths of the Arteries.

Not only Choler and the pancreatick Juice are preſſed forth by the Cathartick into the inteſtinal Pipes, but further the ſerous Humours are as it were milked forth from the Glandulaes of the interior Coat, being ſtraitned by reaſon of the Vellication, and the Mouths of the Arteries rubbed, and opened, which do waſh more the Contents of the Belly, and both by making ſlippery, and by irritating move forward the Excrements. But the inteſtinal muck it ſelf beſmeering the hairy Cruſt is indeed waſhed out by the ſerous Humours wrung forth, and by reaſon of the nervous Fibres being wrinkled, and ſhaken, is wiped away, goes to the purgings of the Belly, and increaſes their heap. Truly ſometimes this muck being very much wiped off, and the Mouths of the Veſſels notably pulled and as it were ſhaven, meer Blood flowing out cauſes the Stools to be bloody.

The Energie of the Cathartick is extended upon the Blood, nervous Juice and ſolid Parts.

Purging Medicines, for that they irritate the Spirits, and ferment with the Humours, do after this manner perform their Operations within the Cavities of the Stomach and Inteſtines. But from what kind of Particles or Elements of the Medicine both this irritative Force and fermentative Virtue proceeds, we will anon inquire: In the mean time, we may obſerve that the Energie of the Cathartick is extended a great way beyond the firſt Paſſages, to wit, into the bloody Maſs, and nervous Liquor, and ſo conſequently ſomewhat to the Brain, *Præcordia*, and other Parts, or *Viſcera*.

What its operation is in the Blood.

1. As to the Blood, it appears from hence that the Particles of the Cathartick is received into its Maſs, and circulated with it, becauſe by ſome, the Urine changes it Smell and Colour. Becauſe the Milk of a Nurſe taking Phyſick purges the Infant. Some Medicines evacuate the Waters of Hydropical Perſons by Stool. The Reſine of Jalap is wont to purge the lixivial *Serum* of the Smell of the Urine. Beſides by the common obſervation, both of the Ancients

cients and of thoſe of latter Days, a carthatick opportunely given in the declination of a Feaver, brings away the feavouriſh matter firſt made ripe, and apt to be ſeparated. Wherefore it is beyond all doubt, that certain little Bodies of the Purging Medicine are admitted into the Blood, and ſpread abroad thorow its whole Liquor. And indeed there is no long ſearch to be made concerning the ways of its entrance, for that there is a neceſſity that ſome Particles of the Medicine, being thorowly mixed with the nouriſhing Juice, do creep thorow the milkie Veſſels. Further when as certain of the Veins as a moſt thick Wood are every where inſerted into the interior Coat of all the inward Parts of digeſtion, it will be obvious enough to conceive, that ſome Particles of the Medicine, as well as of the Aliment are carried into the Blood by theſe Pipes, which being diffiated in a great abundance firſt within the Veins, and afterwards alſo within the Arteries (whilſt that they are altogether heterogeneous and untameable) do agitate its Maſs, and variouſly ſcatter it, and provokes an excluſion of it ſelf together with other excrements of the Blood. But the Blood ſo ſcattered abroad, and ſtirred up into excretory fermentation, thruſts down the Particles of the Medicine, together with other recrements to be purged forth by the little Paſſages of the Inteſtinal Arteries at that time alſo pulled and opened by the Medicine, into the Cavities of their *Viſcera*, from whence by and by they are ſent away by Stool. After this manner, the ſerous Filth, and Superfluities or Corruptions of the Blood are purged forth, from the Maſs being ſent together with the Cathartick Tincture to the Inteſtines. Moreover when as Sanguiferous Veſſels being by this means to be filled, other ſuperfluous or recrementitious Humours being firſt depoſited about the *Viſcera*, *Præcordia*, Brain, or habit of the Body, are ſwallowed up into the bloody Maſs, and preſently from thence, during its Excretory Effervencie, being ſnatch'd rowards the Inteſtines which way is then open, are caſt forth adoors; and ſo after this manner Cathartick Medicines operate on the whole Body, and carry away from the Parts howſoever remote the Incongruous, and to be exempted Matter.

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This is performed partly by fermentation, partly by irritation.

As we have already noted three degrees of the humoral *Diarrhœa* or natural Cathartick, ſo now it ſeems beſt, that we conſtitute ſo many ſpecies or Claſſes of medicinal Purgation. The firſt of theſe is when by reaſon that the nervous Fibres of the Inteſtines being gently provoked, the fleſhy Fibres being contracted more ſtraitly and more often a little above their wonted manner, they move forward their more looſe Contents, more ſwiftly from one part to another, and at length gently caſt them out of Doors. In the ſecond ſpecies of Purgation, ſome Humours beſides, being wrung forth from the biliarie Pore, the Pipe of the *Pancreas* and the Mouths of Veſſels hauled by the Medicine, are thruſt forth together with the *Fæces* of the Belly. In the third theſe Pipes being more vehemently provoked, they pour forth into the Cavities of the Inteſtines a great plenty of every kind of Humour, and further a recrementitious matter both from the Blood, ſcattered, and precipitated by reaſon of the admitted Particles of the Medicine, and by conſequence alſo from the nervous Juice, and other Parts, is purged forth being carried by the Arteries to the Inteſtines.

Three degrees of Cathartick Operation.

I think it appears plain enough by theſe that a Cathartick acts only by irritation, fermentation and expulſion and not (as is commonly ſaid) by Attraction; nor does it indeed become a reaſonable Philoſopher nor any that hath the uſe of ratiocination to affirm any Medicines by reaſon of ſimilitude of Subſtance, or I know not what Specifick Virtues to act upon any determinate Humour and to carry it whole and by it ſelf out a Doors. But that ſometimes Choler, Phlegm, Matter, *Serum* or Melancholy is judged to be ſeparated apart one from another, that ſeems to be ſo done, either becauſe Medicines do irritate in the *Viſcera* after a diverſe manner, or they ferment with the Blood and other Humours by various means, or laſtly they put the Tincture in the Stools themſelves. It will be worth our while that we ſhew ſome reaſons and inſtances of every one of theſe.

Cathartick's do not operate by Attraction or Election.

Firſt therefore, Medicines do irritate within the Cavities of the *Viſcera* after a divers manner according as they contain more volatile or fixed Particles, more gentle, or more eager, more ſoft or more aſper, and for that cauſe ſtir up now in theſe places now in thoſe ſooner and rather more light or ſtronger Excretory Convulſions. Of theſe kinds are Roſes, Violets, Caſſia, Manna and others

The difference and reaſon of the operations of Cathartick's.

Part I.

others the like, which are of ſubtil parts and very tenuous, and for the moſt part do not diſturb the Ventricle; but being come to the *Pylorus*, they begin to irritate the more exquiſitely ſenſible nervous Coat of of the *Duodenum*, and before they go any further they there ſpend almoſt all their whole Strength; and ſo as the biliary Pore is ſhaken by the pulling and corrugation of that Coat, bilious Stools follow. On the contrary others, as Gumm Ammoniack, *Opopanax*, *Sagapenum*, Turbith and the like, which conſiſt of a thicker and more viſcous matter, and more obtuſe Particles, are not of ſo prompt an operation, that they ſhould preſently irritate; but being diſſolved within the Ventricle, and thence ſliding into the Inteſtines, and being brought into them not preſently, but after ſome time, and after that they have for a while adhered to their Coats, they begin their Vellications beneath the biliary Pore, wherefore they ſhave and wipe away beſides the *fæces* of the belly, and certain ſeroſities preſſed from the mouths of the Veſſels, the filth beſmearing the Inteſtines, and therefore they cauſe the appearances of pituitous Stools.

1. *For as much as they irritate after a diverſe manner in the* Viſcera.

2. For as much as Medicines indued with Particles of a diverſe kind, do ferment after a diverſe manner with the Blood and other juices; therefore follow now ſerous now bilious Stools, or elſe of another kind. For ſome, as chiefly Aloes and Rheubarb; becauſe they contain in themſelves Particles as it were of an aduſt matter, they beget ſuch in the Blood; and ſo alſo ſtir up its aduſt excrements into motion, and force more plentifully into the choler carrying Pipes: And for this reaſon when the Bile more copiouſly heaped together, flows from its receptacles into the Inteſtines; the Stools become more bilious. I have known ſome accuſtomed to be purged by by drinking two pints of ſimple raw Milk, to caſt out by Stool nothing but yellow choler: The reaſon of which is, for that Milk it ſelf goes into choler, as may be inferred from the bitter belching, and the heat of the Blood (as it were ſwelling bile) being quickly ſtirred up. Further, other Catharticks as *Jalap*, *Colocynthida*, *Elaterium* and certain preparations of Mercury conſiſt of more ſharp and not ſeldom as it were maturating Particles; wherefore the which being received by the Inteſtines, and from thence tranſmitted to the Blood, notably diſperſe its Maſs, and precipitate it very much into ſeroſity: Yea ſometimes they as it were poyſon and corrupt its *Craſis*, or natural Complexion. Then indeed at the ſame time in which the Blood is ſcattered abroad, there is a vellication in the Inteſtines, and the ſerous excrements of the Blood, and its corruptions and melted fats are ſpewed forth into the cavities of thoſe *Viſcera*, from the mouths of the Arteries there opened; and ſo they induce very watry Stools. If that after the Blood ſo ſcattered abroad by the Medicine, and hurt in its natural Complexion, a little or no plentiful evacuation follows by Stool; the Blood being even more depraved by the incongruous mixture and corruptions, acquires from thence either a notable Dyſcraſie, or pouring forth its recrements and corruptions into the habit of the Body, cauſes puſtula's and watry bladders to break forth in the skin. For ſo from a greatly uſed Evacuation inconveniently made, oftentimes great evils follow: Neither is it for nothing that the common people are ſo afraid, if at any time the Medicine ſhould work but little, leſt the Virulency contracted and left from thence, ſhould lye hid a long time after in the Body, and at length produce malignant Diſeaſes: For ſometimes from ſuch an occaſion as it were leprous paſſions or alterations of the ſenſes are ſtirred up; ſo not long ſince when as a Cathartick Powder (and as it ſeems Mercurial) was exhibited by an Emperick to two Sons of a certain Oxfordian, one of them was purged in the ſpace of forty eight hours a hundred times at leaſt, with great torment and ſwooning away of the Spirits: In the mean time the other being a little older had no Stool, but within a few days his Hair fell off, his Nails grew black, and moreover in a ſhort time after watry Puſtulaes broke forth through his whole Body, which growing hard into a cruſty Scab, and then falling off, preſently new ones ſprung up again: This kind of Diſeaſe, by reaſon of the complexion of the Blood highly vitiated, and as it were, poyſoned, yielding to no remedies, exerciſed moſt grievouſly this poor Wretch, above two years before it could be perfectly cured. Not only from Mercurial Medicines, but ſometimes from other Catharticks taken from the family of Vegetables, the Maſs of the Blood is ſo depraved, that it cannot be reſtored or renewed but in a long time after: So that *Helmont* doth not altogether vndeſervedly calumniate, ſaying cathartick Medicines do not always or only bring away the humours

2. *For as much as they ferment variouſly with the blood.*

The evils of Elaterian or ſtronger Purging.

Shown in a notable Hiſtory.

humours firſt exiſting in the Body, but by their corrupt power cauſe them to be depraved.

Part I.

3. The error of elective Purgation carries its Roots yet more deep, for that when ſometimes the liquids thruſt forth through the Belly, change their Colours from the Medicine; 'tis falſely believed the bilous and melancholy firſt exiſting to be brought away apart from the other humours, there is nothing more uſual than from Rhubarb, Aloes, the roots of *Cucurma*, and certain other medicinals being taken, as the Urines ſo the Stools to be tinged with a yellowneſs: In like manner the infuſion of *Senna*, alſo Catharticks in which Chalybeats or Vitriolicks are mixed, dye the fæces of the Belly which they evacuate with blackneſs. Further the diverſe conſtitution of the Body, and diſpoſition of humours produces divers appearances of Excrements. Becauſe when the Choler-carrying Veſſels ſwell with Byle in theſe, the Salts of the vitriolick Tincture in theſe, being black Parents are houſed in the firſt paſſages; and in other places through the ill means of living, very many ſeroſities are heaped up in the whole Body; wherefore when theſe kind of Stools follow from any medicine whatſoever, if that theſe humours commonly called Cholerick or derived from the Choler, thoſe from the heat of melancholy or theſe watry happen to be purged, ſuch are affirmed to be picked forth by the elective Medicament. What therefore belongs to the choice to be had in purging Medicines, notwithſtanding that thoſe cryed up claſſes of Medicines appropriated to this or that juice, do not pleaſe; yet we think that any Catharticks in all caſes are not indifferently to be uſurped, but that it is the work of the judgment of a prudent Phyſician, and of a ſagacious diſcerning, that according to the ſtrength, temperament, the ability or tenuity of the *Viſcera*, bearing, cuſtom and imagination of the Patients; yea, according to the nature, time, and condition of the Diſeaſe, that a purgation gentler or ſtronger, from hot or temperate things gentle or more ſharp, in ſolid ſubſtance or liquid, or ſome other of another kind or form, be preſcribed.

Whence the error of elective Purgation begun.

The more ancient Phyſicians, with whom alſo many Neotericks agree, did ordain a previous preparation of the humours for elective Purgation, as neceſſary to it: Wherefore in their practical Books as often as cathartick Evacuation is preſcribed, a long *ſeries* of deſtinated preparations for every humour, in a ſolemn manner as it were with a certain pomp is propoſed; the uſe of which though ſpecious enough ſeems not to be profitable; becauſe in truth there are no ſuch humours, as we ſhall ſhew clearly in another place. But truly as a purge is not convenient at any time, nor in any ſtate of Body, that you may go about it rightly; both opportunity and a certain preparation is required, and both theſe reſpect the firſt paſſages and the ſanguinious Maſs.

The preparation of the humours not neceſſary to purging.

What preparation is required for purging.

As to the firſt, if at any time the Stomach is burthened, either with the loading of a viſcous Phlegm, or is troubled with an Æſtuation of turgid Bile, a Cathartick is very often uſed in vain or unhappily, unleſs theſe Contents are firſt of all bruſhed out by a Vomitory, or their aggravation and effervеſcency mended by Digeſtives.

1. *In reſpect of the Stomach.*

But as to what belongs to the Blood, Purging is oftentimes unſeaſonable, and ſometimes alſo incongruous; but in neither of theſe caſes are the ordinary preparations convenient, but only Alteratives: Becauſe not theſe imaginary humours are to be diſpoſed for evacuation, but the Blood it ſelf ought to be reduced either from its troubled and confuſed ſtate, to a quiet Condition; or from a Debility or Dyſcraſie to a ſtrong and equal temperament. Whilſt that the Blood ſeavouriſhly boyling is diſturbed in its mixture, a Purge is always conceived to be hurtful; and therefore condemned by *Hippocrates* and the Ancients: No leſs are thoſe Evacuations forbid whilſt its Maſs being languid and weak, doth not ariſe to due fermentation. Further, when the Blood is above meaſure bilous or watry, or is too much inclined either to Coagulations or Fuſions, Purgings and ſuch kind of drainings, do not move away its depravation, but oftentimes augment it. But in theſe caſes alterative Remedies are rather preſcribed, which may deſtroy the wicked Combinations or elſe the Separations of the Salts, Sulphur, and *Serum*, and take away their enormities: But concerning theſe Medicines of cathartick Evacuation, either previous, or which is often better, theſe ſupplying its turn, *viz.* Digeſtives and Alteratives, we ſpeak of them ſpecially hereafter.

2. *In reſpect of the Blood.*

There do not occur many more things to be ſpoken concerning the Theory

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of purging Medicines, beſides truly (as appears by what has been already ſaid) Catharticks irritate both the Spirits inhabiting the ſplanchnick Fibres, to wit, theſe into troubleſome Senſions or Feelings, and therefore the others into excretory Contractions, further ferment both the humours and the Blood, and compel them into various fuſions and ſeparations of Parts: It reſts that we enquire upon what kind of Particles, whether elementary or ſecondary, and (as I may ſo ſay) Qualitative, this double Virtue both irritative and fermentative depends. Concerning theſe in general we obſerve, which afterwards ſhall be confirmed by inſtances, the irritative force which uſes to ſhew it ſelf in the *Viſcera*, and by whoſe inſtinct the cathartick Convulſions are provoked by no means to proceed from the principles of the Medicine either ſpiritual, watry, or earthly Particles, neither from the Saline or Sulphureous alone by themſelves, but to ariſe from them always combined, and ſometimes with others joyned to them. For although Salt and Sulphur are the chief Inſtruments of cathartick Irritation, yet neither of them ſimple uſes to be ſo infeſtous to the *Viſcera*, as that it ſhould ſtir up the moving Fibres into Excretory Convulſions, but they conjoyned together, do mutually exalt one another, and inforce into little prickings, yea acquire an inimical, and indeed an untameable diſpoſition to our Body. The tincture of Antimony, alſo its Ceruſs brings no trouble to the Stomach, but are rather grateful, and Cordials. But the Crocus of Metals, *Stibium*, the butter of Antimony, and others prepared out of Sulphur and ſalt conjoyned become Emeticks or great and ſtrong Catharticks. In like manner we ſomewhere obſerve the ſaline and ſulphureous Particles ſeparated one from another, and by themſelves, to be grateful enough in ſmell and taſte, but thoſe being intimately commixt preſently to attract a Fetor and rammiſhneſs.

A double faculty or virtue of a Cathartick; irritative and fermentative.

By what elementary Particles either of them depends.

The irritative doth not proceed from Spirit, Water or Earth.

Nor from Salt or Snlphur alone.

But from them combined together.

But as to what reſpects the Cathartick Fermentation, it doth not ſo plainly appear whether indeed the ſame Particles which irritate the Spirits into Excretory Convulſions, do alſo ſcatter the blood, and make it to ſeparate into parts, ſo that they may caſt forth its Excrements into the Cavities of the *Viſcera* from the mouths of the Arteries. Truly the Blood even as milk is for the moſt part ſcattered and precipitated into ſeroſities only by acid things; as ſhall be hereafter largely declared by experiments and reaſons. The Alcale ſalts fixed and volatile and alſo Nitrous do not diſſolve the Mixtion of the Blood, but rather preſerves it whole, and being ſoluted reſtore it; and in like manner do the Spirits of Wine and other moſt pure Sulphureans: But let the acid ſalt only be wanting to promote the Cathartick, the purging force of Medicines may be broken, or wholly taken a way by nothing more.

On what kind of Particles the fermentative virtue depends.

Therefore that we may give our judgement concerning purging Medicines, examination being made by the ſenſe, it ſeems moſt likely, that they imbued (being for the moſt part of a ſharp taſte and ſomewhat pungitive) with a certain volatile and ſharp ſalt, together with Sulphur, (which ſalt in the more ſtrong is as it were Septick or Putrefactive) but theſe their ſulphureous ſaline particles do not ſcatter the Blood by means of the acid or other precipitatory ſalts, for as much as whilſt they embrace more intimately and friendly certain parts of it, they ſnatch them away from their other companions, and bind them to themſelves; but on the contrary the Cathartick Particles being incongruous to the whole bloody Maſs, and to all its Particles, and as they are immiſcible and untameable, they agitate all thoſe with their confuſion, and ſtir them up to an expurgative effervency; which, there being preſently received a more quick pulſe of the Heart, is not quieted before all Heterogeneous Bodies be caſt out of doors, a certain portion of the ſerous Humour wherewith they are mixed being expulſed with them and ſometimes other excrements of the blood. The bloody Maſs being infected after the like manner by the Particles of a ſtrong Cathartick growes hot, even as generous Wines, heterogeneous things being caſt into the But, are ſaid to ferment anew, for the excluſion of that incongruous thing, ſo that ſometimes they boyl up within the Cask, until that either the Veſſel be broken, or that their Complexion be thorowly vitiated. But this doth not ſo frequently happen to the bloody Liquor, becauſe both the incongruous Particles of the Cathartick, and others of the Blood vitiated and ſeparated by them, caſt out by the Arteries and ſcattered on every ſide, and eſpecially more widely opening, into the Cavities of the Inteſtines. However ſometimes the more vehement purgers greatly pervert the Temperament of the Blood, and as it were poyſon it. But truly ſome of them planely putrefactive, and corruptive, do work by

The Cathartick force of a Medicine from Sulphur, we call a latile Salt, and as it were putrefactive.

The more ſtrong Catharticks work by ſtool even as Canthar-ides *by the urine.*

by ſtool after the like manner, as Cantharides by urine; to wit, they melt and corrupt in part the ſanguinious Liquor, then its meltings being rejected with the particles of the Medicine, for their ſharpneſs, they very much irritate the parts which they paſs thorow, and often corrode them. Wherefore they who have a care of their health or life, muſt ſhun Empiricks, uſing for the moſt part only Mercurial or Elaterian evacuation, more than a Dog or a Snake. Part I.

CHAP. II.

The Kinds and Forms of Purging Medicines and the Reaſons of their Compoſitions.

Scarce any Catharticks out of minerals.

MInerals do not contribute much to the Claſs of Catharticks; although the more celebrated Vomitories and Diaphoreticks are chiefly taken out of its ſtore: But Purgers for that they are of a middle vertue and of a diverſe Operation, will not be made out of thoſe impure and hard Concretes. For if that any elaterian force be left, how correct ſoever it be, as it were ſome ſharp prickings in the mixture, whatſoever of irritation proceeds from thence in the Ventricle, induces vomiting, but if thoſe be wholly taken away, no Excretion is ſtirred up in the *Viſcera*, but by reaſon of ſome reliques of the alchale Salts, of all it orce runs into ſweating. For indeed emetick Medicines ſeem to be of that ſort, which, when they can by no means be ſubdued in the Ventricle, and tamed, and are indued with more ſharp and as it were pricklie, to wit, ſulphureous ſaline Particles, provoke the ſtomachal Fibres violently into excretory Convulſions, whereby they might be thence exterminated in a moment by the ſhorteſt way, to wit, by Vomit: on the contrary Diaphoreticks, though they cannot be overcome and tamed, yet indeed their Stimulaes or Prickles being taken away, their Particles are broken into ſmall as it were globulary or round bits, and free from Prickles, do not irritate the Stomach, but paſſing into the Maſs of blood, ferment that, being immiſcible, and not to be tamed, and ſtir up an univerſal effervency, whereby they may evaporate with the ſerous juice, and other excrements of the Blood. But purging Medicines being indued with incongruous, but yet more blunt aud weaker Particles, do not preſently or vehemently irritate the ſtomachal Fibres; but yet after they have entered them a little more deeply, they firſt move a troubleſome ſenſe, then that they may caſt forth a doors what is troubleſome, without much perturbation; they cauſe the wonted and ordinary excretory motions, to wit, by the inteſtinal Pipes to be increaſed and multiplied.

The chief Emeticks and Diaphoreticks are taken out of that ſtore.

The reaſon of this difference inquired into.

Some purging Medicines not properly ſo called out of Minerals.

But yet ſome from Minerals as *Mercurius dulcis*, *Lapis Lazuli*, the Armenian ſtone, and ſome others though improperly are numbred with Catharticks, for they are not of a truſty or certain operation, therefore ſhould be rarely given by themſelves for that end, but with other purgers are given not without benefit.

Very many Catharticks and of various Kinds from vegetables.

But deſcending to Vegetables, we here enter into a large field, and thick beſet with Catharticks: which, for that they are many, are wont to be numbred, and diſtributed in various manners; to wit into more gentle, more moderate, and more vehement, alſo into ſuch as carry away Choler, ſuch as carry away Melancholy, ſuch as carry away Phlegm, and into ſuch as carry away Water: further into purgative minoratives or leſſeners and eradicatives or rooters up. It is not for us to inſiſt upon every one of theſe Tribes, but we ſhall reduce the whole Cathartick ſtore to three kinds only, to wit, in the firſt place to be reckoned thoſe which cauſe a light irritation in the *Viſcera*, and only a gentle fermentation in the blood and humours: of which kind are Violets, Caſſia, Tamarinds, Roſes, Rhubarb, Senna, Myrobalans, *Epithymum*, *Carthamus*, Agarick, Aloes, and the like. In the ſecond place ſuch as ſtir up both a vellication in the *Viſcera*, and an effervеſcency in the humours more ſtrongly, for as much as by theſe, great perturbations, and ſometimes feavouriſh, by thoſe convulſions with pains though not very great are excited: in which Cenſe are placed Scammony, Turbith, Hermo-

A numbring of Purgers.

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dactyls, Mechoacan, Jalap, Danewort, Elder, Opopanax, *Sagapenum*. Laſtly are placed ſuch as cruelly pull and tear the Ventricle and Inteſtines, yea thorowly agitate, diffuſe, and ſeparate the blood and other humours in their mixtion, with a certain ſeptick or putrefying force: ſuch are Hellebore, *Elaterium*, *Soldanella*, *Euphorbium*, Spurge, *Colocynthida*. &c.

Vegetable Cathartick do not want much chymical Preparation.

Vegetables have not always as minerals, need of a long preparation to unlock their cloſe-joynted Powers; for theſe oftentimes, whilſt that the mixtion is whole (but of thoſe we have obſerved otherways) do operate more ſtrongly. For the vertue of theſe conſiſts in a ſubtil and fugacious *Syſtaſis*, and need not to be reduced by great labour and chymical preparation into Extracts, Magiſterials or Quinteſſences, but very many of them as Rhubarb, Manna, Caſſia, Senna, Myrobalans, *&c.* being reduced into little pills or powders, or infuſed in a fit liquor or decocted, work both better and eaſilier; which if vexed by too much artifice, either they wholly caſt away their purgative force, or they exerciſe it ſlowly and with trouble. It is an uſual thing for the drawing forth the Tinctures of Vegetables, to impregnate the liquor into which they are put with the ſalt of Tartar or of Wormwood, for ſo they obtain a deep colour. Although I do not diſallow this way, for as much as the fixed ſalts of the herbs do boyl up with the acid juices of the Ventricle and Inteſtines, yet the deceit lying in it ought to be done away: for that the ſalts do not draw forth that tincture, but make it appear. For if you add the ſalt of Tartar to the infuſion of Rhubarb, Senna or other Vegetables already made, and ſtrained, forthwith its Tincture or Colour becomes much more deep: the reaſon of which is, for that the fixed ſaline Particles being ſomething blunt do fill up the pores of the liquor, ſo that the beams of the light are very much broken in paſſing thorow them: for which reaſon every Tincture is made deeper becauſe of the ſalt of Tartar, by the ſpirit of Vitriol being infuſed therein, whoſe Particles are ſharp poynted, without the precipitation of any matter becomes preſently more clear and thin.

Some of them are made better by extraction.

What the Salt of Tartar contributes to the extraction of purging tinctures.

Chymical preparation for reſinons and ſaline extracts very uſefjul.

But truly ſome of the vegetable Catharticks are likewiſe mended by a Chymical preparation: for from ſome filled with Salt and Sulphur the active and benign Particles may be picked forth from the remaining more dull and malignant, and reduced into reſinous Extracts or ſome other compendious things of another kind; the Analyſis and ſhort compoſition of theſe is certainly inſtituted, with very good profit. Wherefore for the rightly preparing certain Catharticks we draw forth with the ſpirit of Wine, the ſulphureous and ſomething the ſaltiſh part, as in the Magiſteries of the Reſin of Jalap, Scammony, Mechoacan *&c.* For others we uſe Saline *Menſtruums*, to wit, diſtilled vinegar, or waters exacuated or made ſharp with the ſpirit of Vitriol or ſalt of Tartar: and that for a double reſpect; to wit, either that the active Particles being ſeparated from the terreſtrial matter, the Medicine may be compoſed in a leſſer heap and more elegant form; or that all the fierce or virulent mixt qualities may be taken away or ſubdued.

The chief Forms of purging Medicines are noted.

It would be a buſineſs of infinite and tedious labour, to recount here all the ſimple Catharticks, their preparations, diſpenſations, and doſes ſingly: what is enough for our purpoſe, as the chief compoſitions of purging medecines, are Potions, Powders, Boles, Electuaries, Morſels or Tablets, and medicated Ale or Wine, we ſhall ſhew the more ſelect preſcriptions of every one of theſe, and thoſe of a threefold kind, according to which the operation of the Medicine ought to be gentle, moderate or ſtrong; to which fourthly are added Receits of eaſily prepared Medicines for poor people.

Potions gentle.

I. Gentle Potions. ℞ Rhubarb ſliced ʒiij, yellow ſanders ʒß, ſalt of Tartar ℈j, put them all night into cold water of Chicory and white Wine ʒijß, to ʒiij ſtrain'd, add of Syrup of Chicory and Rhubarb ʒß, water of Cinamon ʒij: make a potion.

Moderate.

2. Moderate. Take of the beſt Senna ʒiij, of Rhabarb, Thoches of Agarick of each ʒjß, yellow Sanders ℈ij, of the ſalt of Tartar ʒß, of Coriander ſeeds ʒj, infuſe them cloſe all night in ſpring water and white-wine warmed of each ʒiij, of it ſtrained ʒiiij, add to it ſyrup of purging Apples ʒj, water of *Mirabolans* ʒij, make a Potion, or take of the decoction of *Sen*, *Gereonis* ʒiiij, of the ſyrup of Roſes Solut ʒj, of the Cream of Tartar ʒß, Cinamon water ʒij, make a Potion.

Take of the beſt Caſſia Fiſtula, of Tamarinds of each ʒß, Coriander ſeeds ʒij, boyl them in ʒx, of ſpring water till a third part be conſumed, take it, clarify it with the white of an Egg, ſtrain it and add thereto of ſyrup of Pippins ʒj, and the Potion is made.

3. Strong

3. Strong. Take of the Decoction of *Sen. Gereonis* (with the addition of the Strings of black Hellebore and Agarick of each ʒiſs) ʒvj. Of the Syrup of Roſes Solut. or the Flowers of Peaches ʒj. of Water of Mirabolans ʒij or. Part 1.

Take of the beſt *Senna* ʒß, of the extremities of black Hellebore and Turbith of each ʒij, of red Sanders ʒj, of coriander Seeds ʒiſs, of the Salt of Tartar ʒß, make a cloſe Infuſion and warm of white Wine ʒviij, all night, of the clear ſtraining ʒv, add to it of the Electuarie of the Juice of Roſes ʒiij, of the Syrup of the purging Thorn ʒvj, Cinnamon Water ʒij, the Potion is made. *Strong.*

4. Potions eaſie to be made for the Poor. Take of purging Line one handful, of ſweet Fenil Seeds ʒij, boyl them in as much ſpring Water as will ſuffice to ʒvj, adding thereto of white Wine ʒij, the Potion is made. After the ſame manner may be prepared a purging draught of the Flowers of Damask Roſes, alſo of Peach Leaves, alſo of the Roots of the *Eupatorium* of *Avicenna* or Agrimony. *Eaſily prepared.*

2. Pills. Firſt of eaſie operation. Take of Stomach Pills with Gumms ℈j, to ʒß, of Tartar vitrioled *gr.* ij, of the Balſom of *Peru* what will ſuffice make thereof 3 or 4 Pills. After the ſame manner may bemade Pills out of the maſs of Pill, *Ruffi*, Maſtick, *de Succino* or Amber, alſo of our Extract Solut. the deſcription of which may be had in the Tract of the Scurvie. 2. *Gentle Pills.*

2. Moderate. Take of Stomach Pills with Gumms ʒß, of the reſign of Jalap *gr.* iiij to x, of Tartar Vitriolat. *gr.* vj, Gumm Ammoniack diſſolv'd as much as will ſuffice, make Pil. iiij. After the ſame manner may be made Pills out of the maſs of Pil. *de Succino: Tart. Quercetan.* Alſo in the place of Reſine of Jalap may be put of Sulphur of Scammonie *gr.* vj to xij, or of the Reſine of Scammonie *gr.* viij to xiiij, or take Pil. Stom. with Gums, ana ℈j of the Reſine of Jalap *gr.* vj to xij, as much of the Balſam of *Peru* as will ſuffice make Pil. iiij. *Moderate.*

3. Stronger. Take of Pil. *Rud.* ij ʒß of the Reſine of Jalap *gr.* viij to xij, of the Balſom of *Peru* what will ſuffice, make Pills iiij to be taken with governance. After the like manner they may be made out of the maſs of Pill Cochie: *de Sagapeno.* Take of Pil *ex Duobus* ℈ to ʒß. *Calomelanos* ℈j make iiij, to be taken with governance. *Stronger.*

4. Eaſie to be made and of leſſer price. Take of the choice Pouder of Jalap ʒij, of Diagridium ʒj, of Cloves and Ginger, of each ℈j, Ammoniac Solut. what will ſuffice, make a maſs, the Doſe is ʒß. *Eaſie to be had.*

3. Pouders. Firſt the more gentle. Take of Rhubarb the Pouder ʒß, of the Salt of Wormwood ℈ß, of Cloves *gr.* ij, make a Pouder, let it be given in a ſpoonful of ſmall Cinnamon water, or in a draught of Broth. 3. *Pouders gentle.*

Take of the Pouder of the greater compoſition of Sena ʒß to ʒj, in a draught of Poſſet drink.

Take of the Pouder of the Leaves of Sena ℈j, *Calomel. gr.* xvij, yellow Sanders ℈ß, make a Pouder, let it be given in a ſpoonful of Panada.

2. Moderate. Take of the Pouder of Diaſen. ʒj, of Creme of Tartar ℈j, make a Pouder, let it be given in a draught of Broth. *Moderate.*

Take of the Reſin of Jalap *gr.* x, Calamel ℈j, Cloves *gr.* vj, make a powder taken after the like manner.

Take of the Species of Diaturbith with Rhubarb ʒß to ʒj, of Creme of Tartar ℈j to ʒß.

3. More ſtrong. Take of Turbith, Hermodactyles ana ʒiij, Diagridium ʒj, Ginger ℈j, make a Powder, the Doſe ʒß to ʒj. 3. *Stranger.*

Take of the Powder of *Cornachini* ʒ‡ After the ſame manner may be given the Powder *Hermodactyl. Compoſit.* alſo the Powder Hydrotick of *Riverius.*

4. Cheap and Eaſie to be got. Take of the Powder of the Roots of ſelect Jalap ʒj, of Ginger ℈j, let it be given in a draught of white Wine. In like manner the Powder of the Roots of Mechoacan, alſo the Leaves of Sena to ʒj may be taken in any Liquor. *Eaſie to be got.*

4. Boles and Electuaries. Firſt ſuch as work gently. 4. *Boles and Electuaries.*

Take of Electuary Lenitive ʒß, of the Cream of Tartar ʒß, Syrup of Roſes *q. ſ.* make a Bolus. Take freſh Caſſia ʒß, Powder of Rhubarb ʒß, Cream of Tartar ℈j, Syrup of Roſes what will ſuffice, let a Bole be made.

2. Moderate. Take of Elect. Lenitive ʒß, of Cream of Tartar ʒß, of Reſine of Jalap *gr.* vj, Syrup of Roſes what will ſuffice to make a Bole. *Moderate.*

Take

Part I.

Take of electuary *Diaphœnici* ʒß, powder of Hermodactyls compounded ʒß, Syrup of Elder what will ſerve: Let a Bole be made.

Stronger. 3. Stronger. Take of Electuary of the Juice of Roſes ʒß, Reſine of Jalap *gr.* x, Cream of Tartar ʒß, Syrup of Elder as much as will make a Bole.

Electuaries are compounded out of the ſame Compoſitions in a greater quantity, by adding conſerves of Damask Roſes or of Peach Flowers: The doſe to be taken betimes every morning, or twice or thrice a week, is the quantity of a Cheſs-nut.

Eaſie to be had. 4. Boles and Electuaries eaſie to be gotten. Take of the Powders of the Roots of Jalap ʒj, of *Mechoacan* ʒß, of Ginger ʒij, of Cloves ʒj, of Cream of Tartar ʒiij, of the ſalt of Wormwood ʒj, of Sugar ʒij, Syrup of Roſes ſolutive what ſhall ſuffice: Let an Electuary be made. The doſe is the quantity of a Walnut.

Solutive Confections and laxing Sweetmeats, the *Diaprunum* of *Sylvius* in the thirtieth Page of the practice of Phyſick.

Morſels or Tablets. 5. Morſels or Tablets of moderate operation. Take of the powder of *Mechoacan*, Turbith Gummous, of each ʒß, of Scammony ſulphurated ʒij, of the Reſine of Jalap ʒj, Red Sanders ʒj, Cream of Tartar ʒij, Conſerves of Violets ʒj, of Sugar diſſolved in Roſe-water and boyled up to a conſiſtence, j pound and an half, make Tablets weighing ʒj. The doſe j or ij of the purging Tablets; Page 18. of the Praxis of Phyſick, *Sylvius*.

Medicinal Wines and Ale. 6. Medicated Wines and Ale or moderate Purgers. Take of the leaves of Senna ʒiß, of Turbith, of *Mechoacan*, of each ʒvj; of the ſtrings of black Helle-bore ʒiij, Cubebs, Galingal Roots, Cinnamon bruiſed, of each ʒij: Let them be put into a large Glaſs with 4 Pints of Rheniſh Wine, of ſalt of Tartar ʒiß; let them ſtand cool and covered for ſix days, add to it Sugar Candy ʒiij, and paſs it thorow the ſleeve of *Hippocrates*. The doſe is ʒiij or iiij.

Take of the leaves of Senna ʒiij, of the Roots of *Polypodium* of the Oak, and of ſharp pointed Dock prepared of each ʒij, of Turbith, of *Mechoacan*, of each ʒiß, of *Epithymum*, Red Sanders, of each ʒj, Coriander ſeeds ʒiß, let them be ſliced and bruiſed, and let a bag be prepared according to Art for 4 Gallons of Ale. The doſe ʒxij to a Pint every morning, or twice or thrice in a week.

The Reaſons of ſome Chymical Preparations.

Mercurius Dulcis.

Mercurius dulcis. Take of the corroſive Mercury ſublimate ʒvj, of the beſt purged Quickſilver ʒiiijß, let them be bruiſed together in a glaſs Mortar to a perfect mixture, then let them be ſublimed in a ſand Furnace, with a fire increaſed by degrees to the height for 12 hours: Let the ſublimation be repeated again and again, adding the Mercury which becomes crude in the ſubliming. At length, the matter being perfectly ſublimated pure and white, let it be gathered together and the excrements done away, and kept for uſe. The doſe is from *gr.* xv to xxx, by it ſelf, or with Catharticks added to it, which may carry down the Mercury quickly by Stool, without danger of Salivation.

The ſublimate Corroſive Mercury, out of which Mercurius Dulcis *is made.*

The corroſive ſublimate Mercury. Take of Calcined Vitriol ℔j, of Sea Salt calcined, of the beſt Nitre, each ℔ß, of purged Mercury ℔j; let them be beaten in a glaſs Mortar or Wooden, to a perfect mixtion, by adding a little of *Aqua fortis* or ſpirit of Vinegar; let them be ſublimed

ſublimed in a ſand furnace, by a fire gradually increaſed to the height: Let the work be repeated if need be, that the matter ſublimed to the ſides of the Veſſel, may obtain a Snow white colour. This work proceeds much more eaſily, if the Quickſilver be diſſolved in *Aqua fortis*, diſtilled out of the aforeſaid Minerals: then let the matter, the humidity being abſtracted, be ſublimed with an intenſe fire. Part I.

As to what reſpects the Ætiology of the aforementioned Medicine, firſt concerning the Corroſive Sublimate, it is plain enough that the Mercury is diſſolved by the Salts (whether they lye hid in the Minerals themſelves, or in the *Aqua fortis*;) and coagulated as it were with them, is carried on high by the ſtrength of Fire. Further, that from the ſame Salts congealing the ſaline Particles of the Mercury, and hiding themſelves within its other Pores, the colour like Snow is produced, and together that by reaſon of the little ſuperficies of the ſame Salts being highly ſharpned, the Corroſive Force doth proceed. Then that by a repeated ſublimated Sublimation afterwards, the Quickſilver being added and incorporated almoſt in an equal Quantity, that acritude may be taken away; the reaſon is for that the ſaline Particles are ſo bruiſed and broken by the Mercurial Particles, being increaſed in abundance, and every where growing to them; that they do not dig and lance the ſenſible Fibres as before: Beſides the powder of this Sublimate being bruiſed in a Mortar grows yellow, by reaſon of the plenty of the Mercury, as it were, emerging. But that the common precipitate, in which the mercurial Particles are greater than the congealed Salts, is highly corroſive, the reaſon is, becauſe the little Bodies of the Fire make ſharp all mineral Particles, in as much as they take away all their ſoftneſſes, and ſtick cloſe to them with their exceeding ſharp pricking Bodies. *The reaſon of both.*

2. *The Reſine of Jalap.*

The Reſine of Jalap.

Take of the roots of *Jalap*, the moſt weighty, black and ſhining, bruiſed groſsly ℔j, of the ſpirits of Wine ℔iij, let them digeſt being cloſe ſhut and warm for two or three days: Let then the tinged Spirit, being poured forth into a Glaſs cucurbit, be taken away, the fourth part remaining, to which let it be inſtilled with cold water; the Reſine will be precipitated to the bottom of the Veſſel, which being waſhed from its filth and dried may be kept for uſe. The doſe of its Powder is *gr.* vj to xij or xiiij.

In this Preparation the ſpirit of Wine draws out the ſulphureous Particles of that Concrete, and that the more eaſily, for as much as theſe in the mixtion were before ſeparated of themſelves and gathered together, as might be gathered from its reſinous and bright ſhining Veins; whilſt that the ſulphureous part is drawn forth, ſome of the ſaline Stems alſo joyned with it: Wherefore this Reſine ſtinking, and ſharp in taſte, purges ſtrongly and becomes eaſily inflammable. This works in a leſſer quantity, and ſtronger than in the whole mixture it ſelf, for as much as all the active Particles, the blunt ones being done away, do grow together. *The reaſon of its preparation.*

3. *The Reſine of Scammony.*

Reſine of Scammony.

This is prepared after the ſame manner as the Reſine of Jalap, but in this Medicine, becauſe that the ſaline Particles in the diſſolving become more, nor are gathered altogether in the Reſine with the ſulphureous Particles, the operation is gentler and weaker than in its whole mixture: For although a great plenty of Sulphur be in the Scammony, yet its operation depends very much upon the ſaline Particles: Wherefore when that its Powder is fumigated by enflamed Sulphur, the purging force is much broken, becauſe that the acid Salts emitted with the fume of that Concrete do enter into or fix the Saline Particles of another kind. The extracted Reſines out of Turbith and Mechoacan, are gotten after the ſame manner of preparation, as from Jalap and Scammony.

4. The

Part I.

The extract of black Hellebore.

4. *The Extract of Black Hellebore.*

Take of the Fibres of black Hellebore ℔ß, bruise them a while grosly in a stone Mortar, sprinkling them with the best spirit of Salt ʒiij: Afterwards being put into a Matrace, pour thereon of the smaller spirits of Wine, impregnated to a yellowness with salt of Tartar ℔iij, adding of *Lignum* Aloes and of Cloves bruised of each ʒij: Let them be digested, close shut and in warm sand three or four days, then filter the whole liquor, and let it be drawn off by a gentle warm Bath, to the consistency of an Extract. The Dose ℈j to ʒj.

This Medicine, because that the active and benign Particles being separated, both from the more dull and virulent, and further more fixed by the Salts of the *Menstruum*, and brought under; they are reduced by themselves into a Mass, operates more gently and in lesser abundance than the Powder of the Root: Moreover by reason of the adjoyned Salts, which grow hot with the Salts of the *Viscera*, and humours of our Body, becomes the more efficacious.

So much concerning Medicines which direct their operations upon things laid up in the Ventricle almost altogether by plain aud open ways, as it were the high Road, to wit, upwards or downwards, by the *Oesophagus* towards the Mouth, or by the Intestines towards the Arse. There remain many others, which either way treading the path to which they were destinated, do make known their actions upon the Blood, and System of Nerves with a various respect to the Heart, Brain, Reins, and other *Viseera*, or on the habit of the whole Body. Concerning which we will speak at length methodically, after that we shall have added some things concerning the Remedy of too much Purging, and especially for the *London* Dysentery.

Chap III.

Concerning the Remedy of excessive Purging, or of Medicines stopping too great Purgation or Diarrhœa. *Also concerning the* London *Dysentery, the knowledge or Theory of which, and the Method of Curing it is inquired into.*

There is equally need of a Bridle as well as of Spurs no less about the right ordering of Purging than of Vomiting: For as sometimes Cathartick Medicines are of necessary use to make slippery the Belly, or to cause plentiful going to the Stool; so if that evacuation be immoderate, or shall not be easily tollerable, opposite Remedies or Antidotes of the *Diarrhœa* or Dysenterick Affection are to be prescribed. By what means and after what manner of affecting purgers do perform their operations, also for what causes besides, and occasions, spontaneous Purgings do frequently happen, is already shown. It shall be our present business in every of these cases, to wit, both in the medicamental *Hypercatharsis* or excessive Purging, also in the *Diarrhœa* and dysenterick Affections to propose the means of curing them, together with select prescriptions or forms of Remedies.

The reason of the Medicinal Hypercatharsis.

A purging Medicine being improportionate either in quality or quantity, works more strongly and longer, and for as much as by irritating too much the nervous Fibres,

Fibres, the animal Spirits are agitated into excandescencies or angers not easily to be allayed, and for as much as it scatters the blood and the humours, and as it were melts them, therefore that their liquifications might be thrust down into the cavities of the *Viscera*, yet greater excretory irritations are made. Part I.

The Therapeutick Method hath respect both to the precaution or prevention and curation of the *Hypercatharsis* or excessive Purging. As to the first there is need of consideration and caution before evacuation in its operation, and after its operation. For in the first place, it very much behoves to weigh both the constitution, strength, and custom of the Body to be purged, as also the nature, dose, manner of working, and ordinary effects of the Medicine to be given; then to proportionate by collected marks the vertue of the Agent according to the bearing of the patient. Secondly whilst that the Medicine operates, the *Viscera* of digestion, the Blood and animal Spirits should be kept free from any other perturbation. Wherefore in that time neither any gross aliments, nor viscous, nor many which may trouble the Belly, should be taken in; all External Cold whereby the Pores of the Body are shut up, should be carefully shunned; lastly the Mind should be pleasing, even and serene, and free from Cares, and more hard Studies. Thirdly the operation of the Medicine being finished, the Excandescency of the animal Spirits ought to be quieted, and the Effervescencie of the Blood and Humours to be appeased; for which end an anodine Medicine, or a gentle Hypnotick or causing rest is given according to the following Forms.

Its precaution. 1. *Before Evacuation.* 2. *In its operation.* 3. *Afterwards.*

Take of the Water of Cowslip Flowers ℥ij of Barly Cinnamon water, Syrop of Poppies, of each ℥ß, of Pearls ℈ß, make a draught to be taken going to rest. or

Take of Conserve of red Roses Vitriolate ℈ij, of Diascordium ℥ß, of Pearls ℈ß, of Diacordium what will suffice, make a *Bolus* to be taken going to sleep.

The Cure of Excessive purging.

If that these things being omitted, or notwithstanding all this Caution, that an excessive purging by reason of the Medicine should happen, presently let the patient be put into a warm Bed and handled after this following Method. In the first place let there be applyed to the Ventricle and to the region of the whole *Epigastrium* or Belly, a plaister made out of the Treacle, or foment it with warm Linnen stoops dipped in the Decoction of Wormwood, Mints, with Spices and red Wine, and so wrung out: then let him take a Bole of Treacle Andromach. or it being dissolved in Cinnamon water. Moreover let him drink now and then a spoonful or two of burnt Wine with Mint water therein. If troubled with the wringing of the Gutts, let a Glister of warm Milk with Treacle dissolved therein, be given: and sometimes they ought to apply warm frictions to the exterior Members, and Ligatures, where by the Blood may be brought outward, and be detained from too great a Colliquation, and effusion into the Cavities of the *Viscera*: then in the evening, if that there be strength and that the Pulse appears robust enough, let a dose of *Diacodium*, or *Laudanum* in some fit Vehicle be taken.

What is to be done in the Symptomes of the Diarrhœa.

As to the other kinds of too much Purging, which, without a Cathartick being given are wont to arise from various Causes and occasions, they require a Medicine; I say for the most part they be merely Symptomaticks of and depend upon other Diseases, and the Method of their cure is the same as of those Diseases themselves from whence they spring. So indeed in the Scorbute and Phthisick it is usual for the Diseased to be troubled with a frequent Flux of the Belly: the Method of curing doth not respect this Symptom, but the cause of the primarie sickness to be done away. But yet sometimes the Flux of the Belly (which is wont to be called the *Diarrhœa*, or Dysenterie) seems a disease of it self; and truly in this City of London, since this kind of Disease is wont to reign almost every Year, and is commonly esteemed peculiar to the place, this place will be very fit, to inquire a little further into its Nature, Causes, and method of curing it.

The London *Dysenterie.*

Although the word *Dysenteria* in common acceptation denotes the bloody Flux of the Belly as well as the humoral Lask. I yet saving the Etymologie, it is lawful to apply this Name to the *London* Disease also when it is not bloody. For I have often, and for a long while, observed this kind of Flux, which is wont to infest us every Year about Autumn for the most part, commonly called the wringing of the Belly or (according to our Speech) the Griping of the Gutts, to be of two far different kinds; in the one the Stools are watry, and as it were clear with a sudden failing of strength, but the other bloody, yet they are tollerable;

Two kinds of it viz. watry and bloody.

Part I.

in the mean time bilous or phlegmatick Stools (whilſt either of the diſeaſes raged) very rarely happen, and denote the Diſeaſe to be not of ſo ill a condition. By which, both theſe Dyſenterical Diſeaſes are known clearly one from another, as to their Differences, Cauſes, and formal Reaſons, it will be to the purpoſe to ſhew here Examples of either of theſe, obſerved then by me, and plainly deſcribed in thoſe years when they were peculiar.

A deſcription of the former.

In the Year 1670 about the *Autumnal Æquinox* very many laboured with the unbloody Dyſenterie, but very cruel and very dangerous. The diſeaſe invading ſuddenly and frequently without any manifeſt occaſion, did reduce thoſe labouring with it, by great Vomiting, frequent and watry Stools, quickly to a very great debility, to horrid failure of the Spirits, and loſs of all their ſtrength. I knew ſome the day before well enough and very ſtrong, in twelve hours ſpace ſo miſerably caſt down by the Tyranny of this Diſeaſe, that with a weak and ſmall Pulſe, cold Sweat, ſhort and quick Breath, they ſeemed juſt ready to dye: and truly not a few to whom fit Remedies or opportunity of cure were wanting, were ſuddenly killed by it. This ſickneſs raging for a whole month began to decreaſe about the middle of *October*, and before the beginning of *November* was almoſt wholly vaniſhed. Very few in that time had bloody ſtools, and not many Bilous but very many had Vomits, and watrie, almoſt clear and plentiful Stools, whilſt that popular Dyſenterie raged ſo cruelly in the City, in the Country or at leaſt three miles beyond the City, almoſt none was ſick of it. Beſides here, although very many were ſick, the diſeaſe did not ſeem to be propagated by Contagion, but to affect thoſe only that were prediſpoſed. For it did not take thoſe who were converſant in the ſame Family with the ſick any ſooner, than thoſe who ſhun'd their Houſes.

Its Cure.

For the Cure of this Diſeaſe no Evacuation did help, yea Phlebotomie, Vomiting, and purging ſometimes did hurt; but for the moſt part, the remedies were only Cordials, and thoſe the moſt hot, to wit, abounding in Spirits, and Sulphur or volatile Salt, that were beneficial; inſomuch as the Spirits of Wine with Sugar a little burnt became as it were the epidemical popular remedy, and in ſuch a Dyſenterie for the moſt part profitable, although in the other bloody Flux, indifferently uſed, oftentimes was found hurtful. The method of curing which I happily adminiſtred to very many then, and alſo am wont ſtill in the like Caſe, was according to the following manner.

Bole.

Take of Treacle Andromach. ʒj, or ʒiſs, in your Bed drink after it of the following Julep 7 or 8 Spoonfuls, and repeat it every third, fourth or fifth hour.

Juleps

Take of Mint water, Cinnamon barly Water, of each ʒiij. of ſtrong Cinnamon Water, Treacle Water, Plague Water: of each ʒiij, Powder of Pearls ʒj of Cryſtals of Sugar ʒſs, mingle them and make a Julep: at the ſame time let there be applyed warm to the Ventricle a little piece of Bread toſted and done over with Treacle dipped in warm water or red Wine, and by and by changed.

Opiates.

In the Evening if the Pulſe and breathing ſhall be ſtrong enough give him to drink in a little draught of Plague Water, of liquid *Laudanum* prepared with Juice of Quinces, gr. xx.

Take of the *Diaſcordium* ʒj, of liquid *Laudanum* ℈ſs, Powder of Crabs Claws Compounded ℈j, of Cinnamon Water what will ſuffice: make a Bole to be taken going to ſleep.

To ſuch as Treacle and Mithridate are nauſeous or not agreeable, let there be given a doſe of the following Powder or of the Spirit of Treacle every third hour with the Julep.

Take of the Powder of Crabs Claws compound, of the Roots of *Contrayerva*, of *Serpentaria Virgin.* of each ʒj, of Cinnamon, of Tormentile Roots, of each ʒſs, of Saffron, of Cocheneel of each ℈j, make a Pouder: the Doſe is ʒſs to ℈ij.

Spirits.

Take of the Spirit of Treacle prepared with Armoniac. ʒiij. the Doſe is ℈j, with the Julep every fourth hour. After the ſame manner the Spirits of Harts Horn, or of Soot may be given. Let his drink be Ale boyled with a Cruſt of Bread, Mace, and Cinnamon, and ſweetened, or burnt Wine diluted with Mint Water. Let his food be Broth of a Pullet, or Gruel, or Panada with the ſhavings of Harts Horn, Ivory, Scorzonera Roots *&c.* boyled in it.

The reaſon of this Diſeaſe.

Let us enquire now concerning the reaſon of this particular Diſeaſe, what is its chief conjunct Cauſe, to wit, what kind of peccant Humour that is to be purged

ed out, that ſhould ſo infeſt the *Viſcera*, and ſhould irritate them into excretory Convulſions with torments, Perturbation of the whole Body, and ſudden failure of all their ſtrength. Certainly none will think this, Choler, or pancreatick Juice, or what elſe you will to be begotten within the inteſtinal Pipes: neither do we believe it indeed from the meer Blood,(as ſometimes happens in the *Criſis* of Fevours poured forth into the *Viſcera*. But rather we ſuſpect (as by the ſudden Languor and ſoon falling down of the Spirits, and enervation of all the parts it will be lawful to conjecture) in this diſeaſe the more noble Juices of the Body, to wit, the nervous and nutricious placed in the ſolid parts to be wholly vitiated from their natural Complexion; and diſſolved and ſpread abroad as it were a ſtream, and to overflow into the bloody Maſs; then preſently from it (they being indeed incongruous and immiſcible,and unapt to be ſent away by urine or by tranſpiration) to be transferred towards the Stomach,and Inteſtines by the Celiack Veſſels,and there flowing forth from the thick planted little mouths of the Arteries, to ſtir up theſe horrid dyſenterical Symptoms. Further it ſeems that together the Blood it ſelf being ſcattered abroad by the flood of the other humours,is melted with them,and being looſened in its complexion, its meltings do burſt forth with the other excrements into the Cavities of the *Viſcera*. Part I.

Certainly all the moving Fibres with the fainting away of the whole Soul on a ſudden can proceed from no other Cauſe, but that the humour actuating them,and in which the animal Spirits dwell,leaving them wholly, doth flow forth; and indeed we ſuppoſe it to flow forth, for as much as it being vitiated in its complexion, and growing ſower like milk doth moleſt the conteining Parts,and irritate them into wrinkles whereby it may be ſhaken off. Beſides we take notice that this Diſeaſe always or for the moſt part began with Cold,to which nevertheleſs heat and a feavouriſh burning did not ſucceed, becauſe the Blood,although but little vitiated in it ſelf,nevertheleſs being wholly overturned by the flood of another invading juice, could not emerge or recollect it ſelf,that it might grow fevoriſhly hot as in the *Criſis*. Hence it was that Cordials, except very ſtrong and hot, as hot waters and Spirits, Treacle, Mithridate and the like, did not help, whoſe highly active Particles,whilſt they eaſily entered into the mouths of the ſplanchnical Veſſels did repel the out flowing humours,and further inſinuating themſelves by degrees into the bloody Maſs, they did invigorate it,and ſtir it up into fermentation,and into the motion of evaporation; whereby it might be able to recover its former diſpoſition,and to caſt back into the habit of the Body whatſoever incongruous thing had entred into it.

It ariſes chiefly from the vitiouſneſs of the nervous Liquors.

So much for the conjunct or next cauſe of this Diſeaſe,the more remote are preceding or antecedent,and manifeſt or evident; thoſe denote from what occaſion or proviſion this kind of morbid and epidemical *Diatheſis* or diſpoſition proceeds; and theſe for what occaſions it rather breaks forth into a dyſenterick Affection. As to the former, that this diſeaſe rages more frequently in Autumn,it is aſcribed by many,to the immoderate or rather autumnal eating of the Summer Fruits; which indeed we ſhould eaſily admit to be a part of the cauſe of the bloody Flux,and alſo we may deſervedly ſuſpect the aforſaid diſeaſe to have ſome certain riſe from thence. But truly this cauſe of the Diſeaſe does not appear to be from hence true and equal, becauſe that many inhabitants of this City abſtaining from fruit,or uſing them ſparingly,every where laboured with this unbloody Flux whilſt it was general;and others who are fruit eaters in the neighbouring Villages altogether free from it were affected with other Fevours without any gripings of the Belly or Flux. For truly I have often obſerved (which alſo hapned this Year) after an exceeding hot and dry Summer,in the Autumn Epidemick and irregular Fevours to have hapned in many places of *England*,and at the ſame time very few Londoners to have fallen ſick of that Fevour, but very many of the dyſenterick Diſeaſe: the reaſon of which ſeems to be, that when our Bodies by reaſon of the foregoing Intemperateneſs of the Summer, are diſpoſed to autumnal Fevours,they are rather determined, in this thick and ſmoaky Air into this kind of Diſeaſe.Becauſe that tranſpiration being hindred,the corruptions of the degenerate humours, being unable to be carried forth thorow the Pores of the skin, overflow within, and there burſting forth from all the Arteries together,they cauſe theſe horrid affections of the *Viſcera*.

Its more remote Cauſes.

Wherefore Autumnal and Epidemical.

Its antecedent Cauſes are 1. *The thickneſs of the* London *Air.*

Further, the ſummer ſeaſon, according as it is more or leſs, hot or cold and moiſt,

2. The intemperateneſs of the Year.

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moiſt, or dry, makes great alteration in the humours of our Bodies, and even alſo in ſome fermentative juices; and perverts them oftentimes from their genuine Complexion into a bitter, or ſharp, or aduſt Nature. Beſides in ſome years this mutation is impreſſed chiefly on the Blood, and in others rather upon the nervous Liquor. By reaſon of the former, for the moſt part autumnal or ſharp continual, or cruel intermitting Fevours do follow; in reſpect of the other irregular Fevours, and if an ill condition do ariſe; in which without any great incaleſcency of the Blood, or *criſis* of the Diſeaſe, very dangerous affections of the Brain and nervous ſtock do happen. Moreover in theſe kinds of affections, either the excrements of the nervous liquor growing degenerate by degrees, being of a ſlow motion, leaſurely and by little and little heaped up without any critick turgeſcency, and remaining a long while within the containing parts, bring forth nervous Fevours, with numneſs and cold; (ſuch as we have deſcribed iu our *Spaſmologie*) or elſe the corruptions of that juice very much, and ſuddenly changed in its complexion, are carried forth more, and growing active do ariſe up with certain overflowings, and flow back on all ſides into the maſs of Blood, from the Fibres, and from the Nerves, and from the ſolid Parts, and from thence preſently running over into the cavities of the *Viſcera*, produce this ſort of unbloody Flux which we have now deſcribed; and hence it further appears that this watry flux of the Belly ariſes rather from the depravation and colliquation of the nervous and nutritious juice, than of the blood it ſelf, by reaſon of the ſudden and and great dejections of the ſpirits (which ſuch an effuſion of the mere blood could not bring forth) becauſe that thoſe labouring with this Diſeaſe, are not troubled with the heat or ardor of the juices, or ſcabritiouſneſs of the Tongue, but do very well bear the hotteſt Medicines; and aſſoon as an inverſion of the peccant humour and a retorſion of it into the habit of the Body, by theſe things taken, is procured, they eaſily grow well without a fevour, watchings and other conſequences of corrupted Blood.

Its evident Cauſes.

We have not much to ſay of the evident cauſes of this Diſeaſe, when there is ſuch a conſtitution of the year, that by reaſon of the evil influence of the air or Heaven, the juices procreated from the blood, to wit, the nervous and nutritious do degenerate from their due temperament or *craſis* into a ſtrange infectious Nature, and as it ſeems ſower, and for that cauſe dyſenterick. Errors in living at that time permitted, with other non-naturals do cheriſh, increaſe, and ſooner bring on this ſort of depraved diſpoſition into an Eccathartick turgeſcency: it will not be worth our while here particularly to explicate all the manifeſt cauſes and occaſions, by which they are made, but rather let us paſs them over, to exhibit the knowledge of the other, to wit, bloody dyſentery.

Of the bloody Dyſentery.

An Example of it deſcribed.

A winter exeteamly cold, ſuch as ſcarce any one living had known, followed the Autumn of the Year, 1670. noted for the unbloody Flux but now deſcribed: the following Summer had no leſs a ſhare of the other extream, to wit, moſt hot and dry, after this upon the approaching Equinox an epidemical Fevour aroſe which raged almoſt thorow all *England*. This, keeping the form of an intermitting Fevour, had Paroxyſms or fits now every day, now every third day, with none or but very little cold only, but with a very ſtrong heat, which, for many hours, and not ſeldom protracted beyond the ſpace of a night and a day, hardly paſſed into ſweat, and that but partial, and often interrupted, no fevouriſh heat ſucceeding. The ſick were preſently affected with an unwonted *Languor*, watching, *Vertigo*, and frequently with a cruel Headache; and the diſeaſe rarely or never to be judged by a perfect *Criſis* did ſorely vex for a long while, or fixing an incurable evil to the breaſt did end in a ſtupifying, or Pthiſical, and oftentimes deadly affection. We have formerly in our *Pyretologie* deſcribed a Feavour like to this, together with the Theory and method of curing it, the like conſtitution of the year preceding it.

An irregular Fever was wont to be contemporary to this in other places of England.

Whilſt that this Fevour in the Country did wander up and down almoſt every where thorow the villages and Towns, at *London* a Dyſentery truly bloody as one may ſay, both full of blood and cruel, greatly raging did precipitate very many into

to

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to the grave. From the first invasion of this Disease, Blood copiously and often was cast forth, and for the most part with grief, and pains of the belly; pertinacious watchings with a fevour, and huge thirst were wont to trouble them, notwithstanding their strength remained indifferently, so as the diseased, after being about a week sick, and going almost twenty times a day to stool were able to rise out of their Beds. These bloody stools although they seemed terrible, yet the sick did not quickly die, but did persist many weeks, yea sometimes months daily voyding blood, and in a great abundance; and at length, if the disease growing worse and worse did tend towards an ill end, before death, other symptoms, and chiefly wakings, a scurf of the mouth and Tongue, thirst and sometimes deadly ulcerations did appear, yea these symptoms breaking forth sooner than the unruly flux; and sooner than its due restraint did shew a great danger of death. The poor by the ill means of living, of a long time before used, also those whose cure was pretermitted, or unluckily administred, did frequently die; on the contrary those indued with a better state of body, and trusting to fit and timely medicines very often escaped. Moreover the disease it self, though epidimecal, yet was not alike malignant in all, but seemed gentler in some, and crueller in others *viz.* the Flux of the Belly was in the beginning sometimes gentle and not unlike a *Diarrhœa*, of which, although their stools were frequent, yet without pain or much blood, they were easily and sometimes quickly cured, sometimes this disease appeared exceeding rigorous and horrid, to wit, in which Blood was poured forth in abundance and with mighty torments, and most sharp anguish. But in some more liquid, and stained with diluted blood, as it were the washing of flesh, in others more thick and deep dyed with thick blood, and waxing white with muck, and also sometimes stuft with gobbets of membranes. The seat of the grief was now higher, now lower, in these the small Guts, in those the thick Intestines, shewed to be more affected.

The method of curing it.

The method of curing it, with the Remedies, which I found to bring help to many, was according to this following manner. In the first place for the stopping a little, or moderating the Flux.

Take of Treacle *Andromach* ʒj, of liquid *Laudanum* Cydoniat. *gr. xx*: make a Bole to be taken going to rest.

Electuary.

Take of Conserve of red Roses vitriolated ʒj, of Treacle *Androm.* ʒj, the powder of Tormentil Roots, *Contrayerva*, Pearl, Coral broken, of each ʒj, syrup of dryed Roses what will suffice; make an Electuary to be taken every fourth or fifth hour. the quantity of a Chestnut, drinking after it of the following Julep ʒiij.

Julap.

Take of Mint water, of Baulm water with Cinamon of each ʒiiij, of Treacle and plague water of each ʒij, of pearl ʒj, of sugar ʒj, mingle them and make a Julep.

A gentle Purge.

After a day or two let there be administred a purging and astrictory potion.

Take of sliced Rhubarb ʒij, of the yellow mirobalans sliced ʒjß, red sanders, Cinamon of each ℈j, let an infusion be made all night in Plantane water, Cinamon, barly water of each ʒijß, let it be strongly wrung forth, to which add of strong Cinamon water ʒijß, make a draught.

Opiates.

I was wont every evening, and in some cases in the day time, to give a good dose of *Landanum*, neither have I ever known this medicine to have been hurtful to any dysenterick person, either that the Narcotick force of the medicine might be overcome by the more acid juice of the Ventricle, and as it were made tame, or rather, that its Particles transmitted to the blood, were again from thence quickly cast forth with the bloody stools, whereby they did less affect the Brain.

To whom the above Confection shall be either nauseous or less fit or agreable, this following Powder may be given in its place.

A Powder.

Take of the powder of red Cloth ʒj, of the roots of *Contrayerva* ʒß, make a powder, divide it into 3 parts, take it in what liquor you please, or

Take of Bole Armenack, Alexiterion (that is impregnated with the juices of the leaves of Tormentil, Bistort, red Roses &c. and dried in the sun) of the Roots of *Contrayerva* of each ʒj, of Pearl, of red Corall, of the whitest Amber of each ʒß, make a powder, the dose is ℈ij, to ʒj.

Aperitives.

Take of Roots of Clove-gilliflowers, *Scorzonera* of each ʒj, of Tormentil, Bistort, *Contrayerva* of each ʒijß, of Harts horn burnt ʒiij, of the shavings of Ivory and of Harts horn each ʒij, Coccinel ʒß, red rose buds ʒij, let them be

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boyled in as much spring water as will suffice to ℔ ij, towards the end add of Conserve of red Roses ʒiij, to the clarified Colature add of plague water ʒiiij, the dose is ʒiij.

For the quieting the torments of the Intestines, and healing their gnawings glisters are wont to be often used.

Take of the tops of St. *John* wort, with sheeps feet or chaudern ʒviij, or xij, of Treacle *Androm*. ʒij, oyl of *Hypericum* ʒjß; make a Glister.

I omit here many other forms of Medicines, which are every where extant in Books of the practice of Physick, and which every one may prescribe, as he ought according as the thing shall require. It now remaines that we inquire a little into the Ætiologie of this Epidemick or rather peculiar Disease.

Shewing the reason of this disease.

It appears plain enough, by what hath been said, that as the unbloody dysentery doth not, so neither doth the bloody flux proceed from the mere more sharp contents of the Intestine. Further as that other disease seems to have had its original from the flood of the degenerate nervous Liquor, and nervous juice; so this chiefly from the corruption and vice of the Blood; and therefore even as of that, a nervous sickness in another place was contemporary with the peculiar evill of this place, so when the bloody dysentery afflicted the Londoners, an intermitting tertian Fevour (as it is described by the Physicians) infested in like manner the rest of *England*. And indeed, tis plane to be conceived that, when as the blood being roasted with the Summer heats, therefore would be apt about Autumn for immoderate fevourish effervescencies, and like wines made warm, for fermentations whereby they might be purged, if it cannot send away its degenerate and to be purged Particles by reason of the perspiration being hindred in the more thick Air, the ordinary way by evaporation, for that it is yet hot, it transfers them towards the Intestines, and indeavours to cast them out there by the more open mouths of the thick set Arteries. But indeed the incongruous excrements of the degenerate Blood, or the *Morbosum inquinamentum* being more thorowly boyled into it, and intimately confused, not easily to be extricated or sifted forth, wherefore it being big and burthened with this loading, whilst in its circulating it passes thorow the smaller vessels, it becomes very much straitned, and therefore, about the internal superficies of the Intestines where the Coats of the Arteries are thinner, the blood there swelling up, together by reason of the heterogeneous Particles with which it is full, being made thick and apt to coagulate, it easily breaks forth; and when it cannot sift out and put off its Excrements alone; pours forth with them greatly infestous and portions of it self.

Three things concur to the constituting this disease.

Therefore for the exciting this popular dysentery, these three things must concur: *viz.* there must be a dyscrasy or evil disposition of the sanguineous Mass, arisen thorow the intemperateness of the year whereby it is very prone to fall into fevourish effervescencies, of its own accord or occasionally. Wherefore whilst this Disease is wont to rage at *London*, an irregular Fevour did the like in most other places. Secondly the Excrements and corruptions of the so boyling blood and degenerate in its complexion, are so confounded, and intimately boyled into it, that they cannot neither be easily sifted forth, nor suddenly cast out either by sweat or urine. Wherefore we have observed the Fevour contemporary and even continual with this dysentery to have been most difficult to pass judgement on, and its Paroxysms scarce ever to have ended in a fevourish distemper. Thirdly, a constipation of the Pores is to be added to these (which determinate the aforesaid dispositions into the bloody Flux) being caused by a smoaky, thick constitution of the Air: For this directs the effervescency of the Blood toward the Intestines, where when its Filth or excrements cannot be sifted forth, and not easily separate from the remaining Mass of Liquor, the Blood spontaneously flows forth it self, in highly infected portions, and therefore apt to run.

This Disease is either gentle or malignant.

By reason of this kind of Provision the ordiuary *London* dysentery, and not very malignant, is wont to arise; which, although in respect of its bloody stools it becomes presently horrid, and for the most part of long continuance, yet it is not very contagious or more often deadly. But moreover this Disease sometimes virulent and as it were pestilential, kills many, and largely shews its miasm or defilement by contagion. Further, in such a condition the portions of the Blood, being touched with a certain malignity begin to be broken as in the pest, and which ought to be sifted forth and cast out, from the remaining Mass, lest the whole be presently over-

overpowred; which indeed being more thick and therefore apt to be purged forth rather by the Belly than by the habit of the Body or by Urine, they are carried into the Coats of the Inteſtines by the Pipe of the Meſenterick and Cæliack Artery; where when they cannot eaſily go away from the remaining Blood, breaking forth partly from the Veſſels, they cauſe bloody ſtools, and partly being fixed in the membrane of the Inteſtines they bring forth in them a Phlegmon or inflammation of the blood or ulcerous diſpoſition, and ſometimes alſo a ſphacelous or mortified ulceration, and quickly killing. Part I.

So much for the bloody dyſentery ſuch as uſes to be the peculiar Diſeaſe of this place about Autumn, with the Cauſes both conjunct and antecedent: as to what reſpects the manifeſt cauſes or occaſions which bring into act the morbous diſpoſition: Firſt there ought to be referred hither the ill means of living, and the pravity of the inſpired Air, wherefore it is familiar in every region, by reaſon of Filthineſs and vitious aliments in the Camps of Soldiers and in the priſons of Captives; beſides many other errors in the non Naturals may belong to this Cenſe, concerning which we ſhall neither have leiſure, nor will it be worth our pains here more particularly to diſcourſe.

Curatorie Indications.

The Therapeutick Indications into which the method of curing or the *Praxis* above repreſented may be reſolved, are chiefly or primarily four, to wit, two in reſpect of the Blood, and as many in reſpect of the *Viſcera*. In the firſt place as to the Blood, it behoveth to drive forward both Excrements and corruptions budding within, outwardly towards the habit of the Body, then to diſſolve its Coagulations, and to reſtore its complexion as much and as ſoon as may be: The firſt of theſe is performed by Diaphoreticks, and the other by proper *Alexipharmicks* or Preſervatives. Secondly as to what has reſpect to the *Viſcera*, the troubleſome ſenſe of the nervous Fibres, and the ſtirring up of the fleſhy to Excretory convulſions ought to be appeaſed, and the mouths of the Veſſels, leſt they power forth the blood and humour into the inteſtinal Pipes, ought to be ſhut up. The firſt of theſe Opiates, and the other Styptick or binding remedies uſe to affect: Beſides theſe it is behoveful to heal the greatly urging Symptoms and evil Affections that are wont to happen to this diſeaſe, the chief of which are a Fevour, with Thirſt, and wakings, torments of the Inteſtines, and ſometimes gnawing, inflammation and ulcers of them.

Two in reſpect of the Blood.

Two alſo in reſpect of the Viſcera.

I ſhall not inſiſt upon theſe primary Indications ſingly and ſucceſſively, but I ſhall contract them together, and ſpeak of them at once. Wherefore the Forms of the Medicines ought to comprehend Remedies of divers kinds, to wit, Alexiterick or preſervative, Styptick or binding, Diaphoretick or evaporating & Opiatick or cauſing ſleep or ſtupifying. Becauſe it will not be eaſy to reduce theſe into a certain method, and Rules which may be convenient for many, therefore I have rather choſe to lay before you now examples of Cures of the Dyſentery done in the Autumn of the year 1671, when this Diſeaſe cruelly raged.

The firſt Hiſtory.

An illuſtrious young Man about 25 years of Age, of a ſanguine Complexion and of a former healthful Conſtitution, about the beginning of *October* without any manifeſt cauſe, fell into a Dyſentery; and although preſently from the firſt day the ſtools were plentiful and bloody with pains, yet being ſtrong, and his ſtrength continuing, he forbore taking Phyſick till the third day, at which time being ſent for late at night I preſcribed this following *Bolus*.

Take of Treacle Andromach. ʒj, liquid *Laudanum* Cydoniat. ℈j, mingle them drinking after it a little draught of the following Julep.

Take of the water of Tormentile mints, and cinamon barly water of each ʒiiij, of Treacle, and Plague water of each ʒij, of Pearl ʒj, of Sugar ʒj, make a Julep. Beſides he took every third hour of the following Electuary about ʒjß, with the ſame Julep.

By theſe Remedies the fierceneſs of the diſeaſe was ſoon leſſened, that in the ſpace of 24 hours he had ſcarce above 6 or 7 ſtools, which alſo were not ſo bloody as the former, but appeared full of little bits of fleſh, and membranes, which without doubt were ſome certain gnawn off Portions of the jaggy or hairy Coat: he took every evening Opiates with *Laudanum*.

On the fifth day of his ſickneſs he took this following draught.

Take of ſliced Rhubarb ʒij, Citrons, Myrabolans ʒjß yellow Sanders ʒß powder of Cinamon ℈j, ſalt of Wormwood ℈ß, make an infuſion all night in plantane and cinamon

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Cinamon barly water of each ʒijß, add to it being ſtrained of ſtrong Cinamon water ʒij.

It purged him 3 or 4 times and gave him eaſe, and the next day, he was better his feavour being abated, ſo that ſeeming to grow well he eat fleſh; but he then preſently relapſed, ſo that the Dyſentery returning with the Fevour; it was more cruel that at the beginning: then becauſe the former medicines began to grow nauſeous, I preſcribed after the following manner.

A Powder. Take of the powder of Tormentil Roots, *Contrayerva*, of Bolus Alexiterion: of each ʒj, of Pearls, of red Coral broken, white Amber of each ʒß, make a powder, the doſe is ʒß, in diſtilled water ʒiij.

Deſtilled water. Take of the tops of Cyprus, Mirtle of each iiij handfuls, of the leaves of Meadowſweet, Pimpernel, *St. John* wort and Clovegilliflowers of each iij M: of the roots of Tormentil & Biſtort ʒvj, red Roſe flowers iiij M: of the Berries or grains of Kermes ʒiiij, of Cinamon and Mace each ʒj, let them be ſliced and bruiſed altogether and put into red *Florence* Wine and red roſe water of each iiij ℔, let them be diſtilled in an ordinary ſtill, let the whole liquor be mingled, and when it is taken ſweetened with Syrup of Coral. Alſo he took of the following decoction ʒiij, or iiij, three or four times a day.

Apozem. Take of the Roots of Avens or herb Bennet of *Scorzonera*, of each ʒj, of Tormentil ʒij, of Harts Horn burnt and powdered ʒvj, of the ſhavings of Ivory and of Harts Horn, of each ʒij, the tops of *Hypericum* Mj, of red Roſes and Pomegranate flowers of eage 1. P, let them be boyled in ℔ iij, of ſpring Water till it comes to ℔ ij, adding thereto towards the end, of red *Liſbon* Wine ʒiij, Conſerves of red Roſes ʒiiij: let them be kept hot, cloſe ſhut for an hour and then ſtrained through an *Hyppocrates* ſleeve.

Every Night he took of liquid *Laudanum* ϑj, in the Dyſentrick Water, juſt now deſcribed with Syrup of Clove Julyflowers ʒiij.

A decoction for the ordinary drink. For the ordinary drink make a decoction of Harts Horn burnt, with Barly, a cruſt of Bread, Mace, Cinnamon, to a Pint and an half of which add a Pint of new Milk.

He took the purging Infuſion again, by the uſe of which and former things, within 10 Days his fevour leaving him the Dyſenterie became much gentler, which though it were without pains or much Blood, yet it continued ſtill with Caruncles, Gobbets of the Membranes, and bloody Phlegm or Gelly, in his excrements. Therefore for corroborating and healing the Inteſtines, theſe following things were adminiſtred.

A Clyſter. Take of the tops of the Cypreſs Tree, of the leaves of Periwincle, and of Mouſe-ear each Mj, Red-Roſe Flowers pug. ij: Let them be boyled in broth made of a Sheeps Gathers, of the liquor ſtrained ℔j, add to it of the Oyl of St. *John*'s-Wort ʒij, honey of Roſes ʒiß, mingle them for two Clyſters, one of which he took in the morning, and the other at five a Clock in the afternoon. *A Plaiſter.* A Plaiſter of red Lead and *Paracelſus*, was laid upon his Belly: he took beſides twice a day of the juice of Plantan with water of *Scordium* or Germander, and Plague water ʒiij; alſo he eat every day a Quince roſted in the Aſhes, being made hollow and filled with the Powder of *Olibanum*, Maſtick, and Tolutan Balſom.

By the conſtant uſe of theſe Remedies, he grew perfectly well within a Month.

The ſecond Hiſtory. About the ſame time another ſtrong young man fell into a terrible Dyſentery: From the firſt day preſently frequent Stools, and very bloody with pain and gripings brake forth, beſides a ſtrong Fever with cruel vomiting, thirſt and wakings moleſted him. When theſe Symptomes were a little mitigated by opiates which he took, by and by he was affected with a *Delirium* and *Vertigo*, with an intermitting Pulſe and horrible ſhakings, for as much as the malignant matter being reſtrained within did forthwith flow back upon the Brain and Nerves, which nevertheleſs preſently was allayed, as often as the flux of the Belly and Vomiting returned. On the fifth day Vomiting forth bloody matter, he complained of a great pain and grief as if it were ulcerous in his ſtomach, that I did indeed ſuſpect there had been there a Phlegmon or Ulcer, as uſes to begin about the Inteſtines, but by emolliating Broths and Milk diet adminiſtred; his Vomiting and pains of his Stomach ſoon ceaſed, but in the mean time the flux of his Belly increaſed. He took that night of *Diacodium* ʒj, with Cowſlip water and Cinamon water of each ʒiß,

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by which remedy he was ſo much eaſed, that in a night and a days ſpace, he remained without vomiting or pains, and with a few Stools only, with a laudable pulſe with often and moderate ſlumbering: But in the following night, although the ſame Opiates were repeated, a very frequent flux of the Belly, and bloody, returned. The next day he took an infuſion of Rhubarb with *Mirabolans*, red Sanders and Cinamon, he voided uſually bilous, highly ſharp and generally bloody Stools; then in the Evening he took of liquid *Laudanum Cydoniat.* drops xxv, in a ſpoonful of Cinamon Barly water, he had moderate and pleaſing ſleeps. Afterwards abhorring any more Medicines, he took only an Opiate every evening, now this, now that, and in a ſhort time he grew well.

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SECT. IV.

CHAP. I.

Of the Diureſis *or Evacuation by Urine, and of Diuretick Medicines.*

The near kin of the Diureſis *and the* Diaphoreſis *with one another.*

WE have ſome time ſince largely enough ſet forth the Original of the Urine, and its compoſition whilſt it was either a part or an excrement of the Blood, its Offices and manner of Separation. But we ſhall here further note, that this hath a certain affinity with ſweat, that, and not ſeldom, they change their courſes, and the matter of the one is conveyed forth adoors by the emunctories of the other: For that the cutaneous Emanations if they are ſtrong and impetuous; ſnatch along with them much of the ſerous liquor deſtinated for the Reins, and transfer it into ſweat: Alſo on the other ſide, when by a copious afflux the *ſerum* is caſt forth by the Reins, it brings inwardly very many little bodies that are wont to exhale by the Skin, and involving them in its torrent, ſends them away by the urinary paſſages. Hence it comes to paſs, that Diaphoretick and Diuretick Medicines, are of a very near alike uſe, and ſometimes reciprocal: By either of them being taken, the maſs of the Blood is ſcattered abroad or precipitated, at leaſt it is compelled to ſeparate into parts, for that the *ſerum* drawn away from the reſt of the Blood, may be driven forth adoors by the more eaſie way which ſhall be granted.

What the matter of the urine is, and from whence it comes.

It is threefold.

Although the immediate matter of the Urine flows only from the Blood, and is carried by the only paſſage of the emulging Arteries to the Ureters, yet oftentimes mediately that is wont to have manifold ſprings, and indeed divers, which for the moſt part may be diſtinguiſhed by a threefold conſideration, *viz.* It is ſtale or mere excrement, and is the watry part of the Blood growing ſtale, which being circulated with it for ſome time, acquires from the incocted ſaline and ſulphureous Particles a lixivial Tincture. Or Secondly, it is that *Dilutum* or ſteeped Liquor, of the yet crude Chyle, which indeed is poured abroad or ſuffuſed in great abundance with the Blood, and being ſeparated again from it before it is dyed with the Tincture, cauſes an Urine plainly limpid, or clear. Thirdly and laſtly, the matter of the Urine oftentimes is a certain water, for the moſt part ſuffuſed or poured abroad from the Blood, or as it were diſtilled into the ſolid parts, glandula's and Pipes of the *Lymphæ* or water carriers, which being plentifully laid up together, and then of its own accord or ſome occaſion being given, gathering together a Flood, and dropping forth from its receptacles by the limphæducts, it is carried back into the veins; from whence by a ſwift paſſage, paſſing through the Blood untouched; it is thruſt down by the Arteries into the Reins; and for that the Particles of Salt and Sulphur are not incocted or boyled into this, by reaſon of its ſhort ſtay in the Blood, from thence a Urine alſo limpid or clear is produced. The Urine of men in health, for the moſt part does participate after a ſort of each of theſe, and according as the matter exceeds in this or that together, the Urine appears more or leſs or not at all tinged. The *ſerum* coming from every part, and being mixed with the Blood, is ſeparated again from it in the circulation in divers places but chiefly in the Reins: For that the Blood bubling up within the Arteries, and being very much rarefied, whereby being ſeparated from thence it might paſs into the Veins; there is a neceſſity that it ſhould put off its ſeroſities and divert them to ſome other place.

As

As this is performed every where through the whole body, ſo more copiouſly and after a certain peculiar manner in the Reins.

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But though it be commonly enough known that the ſeparation of the *ſerum* is made in this place, yet it is very much controverted by what means it is done, whilſt theſe affirm the ſerous liquor to be drawn to the Reins, to be there only ſtrained thorow; and others believe a certain ferment to be eſtabliſhed in the Reins, by whoſe inſpiration the *ſerum* of the Blood, as that of Milk, is ſcattered and precipitated by a ſharp coagulation; and the odor, and the rank and ungrateful ſavour of this *Viſcus* ſeems after a ſort to argue that the thing is ſo. Before that we can certainly determine any thing of the virtues of Medicines which provoke Urine, and their manner of operating; it will be neceſſary to unfold this doubt; what is performed in the Reins by the accuſtomed means of Nature, and what in the ſanguineous Maſs, for the ſeparation of the *ſerum*.

How the ſerum *is ſeparated from the Blood within the Reins.*

And firſt of all there is no need of proving the *ſerum* not to be drawn to the Reins among Philoſophers, when that of late ſimilar attraction has begun to be wholly exploded by moſt *Virtuoſo*'s, and all local motion is affirmed to be made only by impulſe. And indeed, what has regard to the preſent buſineſs, by whatſoever things the circulation of the Blood is made known, it alſo plainly appears, that as the Blood ſo the *ſerum* being an inſeparable Companion within its Veſſels, is driven forward by the mere motion or impulſe of the Heart to the Reins. But whether it be there ſeparated by percolation or ſtraining only, or alſo by a certain precipitation, we muſt, that it may plainly appear, a little more accurately inquire or ſearch into the Anatomy and uſe of the Reins.

The ſerum *is not drawn to the Reins.*

Concerning the ſtructure and uſe of the Reins, as divers both ancient and modern Authors have publiſhed various things, the moſt famous *Bellinus* hath the moſt accurately ſhewed their Anatomy. Indeed every one hath ſhewed plainly the Blood to be carried to the Reins by the emulgent Arteries, and to be carried back again by the Veins: This the Laws and Inſpection of ſanguineous Circulation manifeſtly declare, but in what places, through what Pipes, and by what workmanſhip the *ſerum* in the Reins is ſeparated from the Blood, and thruſt away into the Receiver; lay hid a long while from the moſt diligent ſearchers, until the aforeſaid Author by an happy invention, diſcovered the ſubſtance of the Reins to be neither Parenchymous, (clotted or congealed bloody ſubſtance) as the Liver and Spleen or Milt; nor fleſhy Fibres, as the Heart and Bodies of the Muſcles, but an heap of membraneous little hollow Pipes, and by theſe ſo very ſmall paſſages the *ſerum* being delated from the circumference of the Reins towards their Centre, to be diſtilled forth into the Receiver: For as much as the emulgent Artery being divided into greater Branches, then into leſſer, and at length into very ſmall ſhoots, conveys the Blood on every ſide to the utmoſt ſuperficies of the Reins; but here when growing hot and rarefied, it ſweats forth from the mouths of the Veſſels, whilſt the bloody part is received by the Veins to be returned back, the ſerous part is inſinuated into the very narrow pores of the little hollow Pipes impervious to the Blood, and flowing through their Pipes on every ſide towards the Receiver, it is thruſt down into a papillary ſubſtance, out of which it leiſurely diſtills into the Receiver.

The Structure of the Reins and uſe.

By this it appears that the *ſerum* is ſeparated from the Blood, by a certain percolation in the Reins: Indeed after the like manner as when the ſame is thruſt forth of the Arteries every where into the Glandula's, for the matter of Tears, of Spittle, of the droppings of the Noſe, and of other Excretions. But further, it is to be thought, that this alſo is done as it were by the fuſion of the Blood, for that the Blood being of its own nature clammy, and apt to be coagulated whilſt that it paſſes through the Reins, it is very much ſcattered and attenuated by a lixivial ferment of this part; becauſe that the ſerous water may ſeparate more eaſily from it: For indeed Piſs or Stale being imbued with ſaltneſs, whilſt that it continually waſhes thorow the paſſages of the Reins, affixes to them ſaline Particles, and from thence infects it with a ſtrong ſmell or with a certain lixivial beſmearing, whereby whilſt the Blood paſſing through thoſe *Viſcera* is inſpired, it is preſerved continually fluid from curdling, and apt to ſeparate into parts in the ſtraining, even as alſo Milk is defended from Coagulation by ſalt of Tartar infuſed. Yea Blood it ſelf when ſent forth from its Veſſel, is wont preſently to curdle and to be coagulated, by reaſon of a ſolution of ſalt of Tartar or Armoniack being thereon poured,

The ſerum *is ſeparated from the Blood by a ſtraining within the Reins.*

The Reins are ſtrong as it were with ferment.

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remains fluid: Therefore a real Ferment doth not, as is commonly beleeved, precipitate the Blood, but defends it from ſuch a condition, whereby it may be it ſelf more freely circulated, and its *Serum* may be ſeparated in due quantity by ſtraining. And truly it is plane enough, that the Reins are imbued with ſuch a lixivial ferment in eating them being cook'd, which are by reaſon thereof of a very rank and ungrateful both taſt and ſmell.

Part of the nutricious juice is ſent away together with the ſerum *thorow the Reins.*

Whilſt that the *Serum* is ſeparated after this manner in the Reins partly by percolation and partly by fuſion, not only the bloody part, but alſo the nutritious as to the greateſt portion of it, paſſing thorow the very narrow Pores of that ſtrainer, is carried back with the Blood by the Veins; in the mean time the ſerous liquor, being imbued with a ſaltneſs both in the ſanguinious Maſs, and by the ferment of the Reins, perpetually ſlides down by the urinary Pipes into the Receiver, and waſhes away, and carries with it a certain tenuous and more elaborated part of the nouriſhing juice, which is the *Hypoſtaſis* or reſidence of healthful urine.

The matter of urine proceeds chiefly from the Blood.

But truly Stale or the matter of Urine as to its ſubſtance, quantity, and quality, proceeds chiefly from the bloody Maſs. For that, as this, hath three chief offices, as we have ſhewn elſe where, to wit, an accenſion or inkindling for to ſuſtain the vital flame, an Inſtillation of the animal ſpirits into the Brain, and a diſtribution of the nutriment unto all pars; by reaſon of all and each of thoſe, there is a neceſſity that it ſhould be moiſtned with a great deal of watry humour, and ſhould be continually rinſed with freſh, and the old ſtill ſhould be ſent away, and that this ſhould be done in a due and conſtant manner, is of great moment for the conſervation of Health.

The ſerum *is ſeparated from the blood ſometimes too hardly, ſometimes too eaſily.*

The freſh ſerous Liquor is introduced into the Blood, together with the nouriſhing juice by an eaſie labour, and is for the moſt part thorowly mingled with it without any obſtacle; but yet the old doth not always ſo readily and truly go away from it as need requires; but is wanting after divers ways about its excretion, and from thence the occaſion of very many diſeaſes ariſe. For truly the *Serum* ſometimes ſticks more unſeaſonably to the Blood, and will not extricate it ſelf from its embraces, as in Fevours evilly, and not thorowly as 'tis judged, alſo in the phlegmatick Dropſie, and Cacochymy or ill digeſtion. But that ſometimes although expulſed by the Blood, the reins relinquiſhing it (which is its chief way of excretion) is diverted to ſome other place, as in Catarrh's, gouty or ſcorbutical fluxions, alſo in every dropſie: Sometimes alſo on the contrary, the *ſerum* paſſing away too ſoon from the fellowſhip of the Blood, before it hath performed its task flies away, and ſupping up the portions of the more profitable humours, ſnatches them away with it ſelf, as in the *Diabetes* or piſſing Evil, and in great floods of Urine which ſometimes happen, and by and by ceaſe again. In theſe kind of caſes as often as the quantity of Urine is either too much defective or too much abounds, the Reins are not always or chiefly in the fault, but the Brain, and rather the Blood, for that its Maſs now too ſtrict and compacted, does not eaſily ſend away the *ſerum*, and other contents to be purged forth, now to lax and apt to be ſcattered abroad, doth not contain long enough both the *ſerum* and nouriſhing juice: Concerning which cauſes and the means whereby ſuch irregularities happen, we will a little further inquire.

The reaſon of this is beſt unfolded by the fuſion, coagulation and reduction of Milk.

And indeed the analogy of the Blood with milk, (which we have in another place more largely unfolded, and ſhall here briefly touch upon) conduces very much to the ſolving of this knot. You muſt know that Milk whilſt that its mixture is kept whole, although it be warm or boyl upon the Fire; all its Particles being promiſcuouſly temperated, do keep the Liquor uniform: But if any acid thing be put thereto hot, preſently the more thick Particles grow thicker into coagulation, and in the mean time the watry with many ſaline Particles, are ſcattered into a tenuous and copious water. Yea it is a well known and vulgar obſervation, that Milk kept ſo long that it begins to grow ſower, if it be ſet over the fire, will be coagulated of it ſelf without any ſharp thing being put into it. Moreover on the contrary, if that Milk be impregnated with any Salt of divers condition from acid Salt, as to wit, fixed, nitrous, or volatile, being firſt diſſolved therein, it will not then be coagulated by any acid thing therein infuſed whilſt it boyls upon the fire: For I have often try'd this with the ſalt of Tartar and of Wormwood, with mineral Cryſtal, with Flowers of Salt Armoniack, Spirit of Harts-horn, and others of the ſame kind. Further, which ſeems more wonderful, if any of theſe Salts or any

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ſolution of them be inſtilled to milk boyling on the fire, and coagulated by ſome infuſed acid thing, the coagulation before made for the moſt part is taken away, and the white, hard, thick matter vaniſhes, and the liquor at length is rendred thin and almoſt limpid, although it doth not wholly reſume the lactiform and homogeneous kind. And indeed I have ſufficiently learned by often made experiments that theſe kind of mutations do conſtantly happen, *viz.* if Beer, Whitewine, Cyder, Vinegar, or any acid juice whatſoever, be dropped into Milk hot over the fire, preſently leaving the whole form of Milk it goes into a white thick matter, and a diluted *ſerum*. Then if to all this yet warm, the ſalt of Tartar, Wormwood, or any other deliquated vegetable whatſoever, or a ſolution of Salt Nitre, or Armoniack, yea the Flowers or Spirits of theſe, as alſo the ſpirits of Harts-horn, of Soot, and ſuch like be poured in, and the mixture be a little agitated, almoſt the whole Craſſament doth vaniſh quite away, only ſome ſmall portions, and certain little coagulated bits remaining, which will ſwim diſperſed up and down thorow the whole Liquor. Further yet on the contrary, if that fixed or nitrous Salt, or Flowers, or Spirits of Salt Armoniack, or alſo Spirits of Harts-horn, or of Soot, be caſt into boyling Milk, and then if you ſhould pour into the hot Liquor, Ale or Whitewine, Cyder or any other ſharp Liquor you pleaſe, no fuſion or coagulation of the Milk ſhall follow thereupon. It will be worth our labour to conſider here from what cauſes each of theſe are made, and what analogy they bear with the fuſion, or inextricability or diſintanglement of the *ſerum* in the ſanguinious Maſs.

By what means the coagulation of Milk may be inhibited or taken away.

By the anatomy of Milk it plainly appears, that there is in it fewer ſpirituous Particles, very many watry, ſulphureous and terreſtrial indifferent, and in like manner ſaline, which are partly volatile and partly fixed: Therefore whilſt that the mixtion is kept whole, the ſaline Particles ſticking to the ſulphureous, divide them one from another, and alſo hinder them that they flee not away, or be combined with the Terreſtrial. In the mean time, the ſerous coming between the reſt ſo equally intermixt, fill up all the vacuities and make the Liquor as it were homogeneous; but then that there ſhould preſently follow a fuſion and coagulation of the Liquor upon ſome ſharp thing being poured to it, the reaſon is becauſe the fluid Particles of the Salt in the acid thing, take hold of whatſoever others ſaline, to wit, both fixed and violatile, are in the Milk; to which whilſt they are ſtrictly united, the ſulphureous Particles ſliding from the embraces of the acid Salts do come together, and ſo being combined mutually among themſelves, and with the terreſtrial, they cauſe that thick ſubſtance ſeparating from the reſt of the Liquor: In the mean time, the watry Liquor having its pores almoſt emptied of its Sulphur and Earth, and almoſt only impregnated with the combinations of the Salts, by and by it becomes thin and diluted. That the thing is ſo, it plainly appears by the even now cited experiments, for as much as this coagulation of the Milk is hindred or taken away, by the caſting in of Salt either fixed, nitrous, or volatile; for every one of theſe Salts lays hold on the acid Salt of the infuſed Curd, and ſo prevents or breaks off its combinations with the ſaline Particles implanted in the Milk: But that the coagulation of the Milk being done away, it is not reſtored to its priſtine form; the reaſon is, becauſe the extraneous Particles of the adjected Salts remaining ſtill in the mixtion, do hinder the redintegration of the ſame mixture; but if they could be taken forth again, certainly the firſt mixture and lactiform would return again: Wherefore it may be thought of the Blood, that it being at any time depraved, although by fuſion or coagulation, becauſe it is wont to exterminate from it ſelf all the heterogeneus Particles, it may recover its due and priſtine mixtion.

The reaſons of them are ſhewed.

But that Milk being long kept and growing ſower, ſhould coagulate upon the fire of its own accord without any acid thing being infuſed; the reaſon is, becauſe in that Liquor then tending to putrefaction, the volatile ſaline Particles (as the manner is) being depreſſed into the *fluor* or ſtream, they become acid: Wherefore theſe, the pores of the Milk being opened in the boyling, ſnatch hold of their fellow ſaline-fixed Particles, to which whilſt they adhere, the ſulphureous ſlide away from them, and being mutually combined between themſelves, and with the terreſtrial, they make the white thick ſubſtance, the *ſerum* together with the combinations of the Salts, being fuſed or melted into an *aquoſitie*. Cold Milk neither of its own accord, nor by any ſharp thing being poured into it

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is coagulated, because, whilst that the Pores are shut, the intestine Particles howsoever disposed so as they may be ready for new marriages or divorces, do not easily unloose themselves, but the Passages being opened by the heat they presently enter into private Combinations, and Schisms or Separations, as occasion serves.

What Analogie there is in the Blood to the Coagulation of Milk, and of the Inhibition or reduction of this.

These things being admitted thus concerning the Fusion and Coagulation of Milk, and Inhibition and reduction from that condition, let us now consider whether in these any like or analogical thing is correspondent to the Blood, and indeed although it be granted that Blood being let forth of its Vessel, will not, as milk boyling over the fire, resolve into Constitutive parts, or variously scatter or coagulate, and then be again reduced from that Condition, by the affusion of Salts, because indeed the Consistencie of the Blood is thicker than of Milk, and is more apt to cloder, moreover this flame or its life being extinct, it is altered very much from what it was in the Vessels: but yet I have found by frequent tryal, which the experiments of others confirm, that the same Liquors, which do fuse a precipitate Milk, as distilled Vinegar, Spirits of Vitriol, a Dilute of Salt or Nitre, and other Acids also being poured upon warm Blood, do presently coagulate it, and so discolour it, that it grows black in the whole Mass, one portion goes into a clottie Cake and the other into a watry and thin *Serum*.

What alterations Chymical Liquors produce being poured upon warm Blood.

Besides these, which inhibit, or take away the Coagulation of Milk, as Oyl of Tartar, fixed Salts of Herbs, a solution of Salt Nitre, of quick Lime, Spirits of Salt Armoniack, Harts Horn and the like being poured upon warm Blood, doth amend, or conserve its mixtion whole, as may be argued from its shining and red sparkling Colour, and its Consistencie remaining alike for a long time; wherefore as it easily follows from hence, it appears that Blood, although in an unlike proportion, is made up of the same kind of Elementary Particles, as Milk. Indeed there are in this more plenty of Spirit, Sulphur, Salt, and Earth; and less *Serum* than in Milk. From whence it may be concluded that the Blood being rightly disposed, to wit, more thick, and too apt to grow together or to clodder, is less able to be fused, and to be loosned into much serositie, notwithstanding whilst that it passes thorow the Reins in the Circulation, the superfluous aquosities, partly by the strainer of the Reins, and partly by their ferment, keeping the Blood from too much Coagulation, by degrees are separated and sent away. But when the Blood is vitiated in its complexion, there is a failing both as to its Constitution, and about the manifold separation of the *Serum*. As to the former, the Blood is now too hot and sharp, now too thick and feculent, and sometimes also above measure, thin and watry: and according to its degenerate sort of state various sicknesses arise, of which we shall not particularly treat in this place. But yet for as much as the Blood is amiss in its *Crasis* or Consistence, though its *Serum* be separated in due measure and manner, no very great healthful Condition doth therefore presently follow. But the Origin of very many Diseases do happen, by reason of the separation of the *Serum* not being rightly performed. But as to this, as there may be divers manner of failings, the fault may be very much in the Defect, or in the Excess. For sometimes the Serous *Latex* sticks too pertinaciously in the Bosome of the Blood, and on the contrary, sometimes slides away too soon, and in this respect the Blood, not containing the *Serum* spews it forth by the little Passages of the Arteries, in very many places, and almost every where; and so thrusting it down into the *Viscera* or habit of the Body, produces an *Ascites* or watrie Dropsie thorow the whole Body, and now sending it away immoderately to the Reins, inforces a *Diabetes* or excessive Pissing. The Blood too much retaining the *Serum*, being very much heated as in a Fevour, hath its body too strict, with complicated and more thick particles boyled together, so that the more tenuous particles cannot easily break forth; or it being stuffed with Scorbutick Salt and Sulphur, becomes very viscid and tenacious, so that the serosities very hardly slide from the embraces of the rest. As thus the departure of the serous Liquor from the blood is after a divers manner hindred, or perverted, there are also Diuretick Medicines of a diverse disposition and operation, which notwithstanding may be distinguished: and first as to the end, according to which they have a regard to the Mass of Blood, or the Reins, or to both together. Secondly as to the matter, in which respects they are either Sulphureous or Saline, and these a-

That the Blood may rightly put away the Serum *it ought to be preserved or reduced both from too much growing thick, or too much fusion.*

Of the Separation.

1. *The separation of the* Serum *offending in excess.*

Also in defect.

The Distribution of the Diuretick.

1. *As to the End.*

2. *As to the Matter.*

again

gain are various, according as the Saline Particles are in a condition of fixedneſs, of flowing, or of Volatility, or further as they are Nitrous, or Alchaliſate. In the third place as to the form, theſe Medicines may be had in a divers manner, but for the moſt part their Compoſitions, as to their Species, are Drinks, or Powders, or Boles, or Pills, or Chymical Liquors, concerning which we ſhall particularly ſpeak anon. In the mean time allthough it ſeems to belong rather to Pathologie or the treating of the Paſſions than to the Pharmaceuticks or Curing by Medicines, to explicate the ſingle ſcopes or ends of Diureticks, yet I think it will be to the purpoſe to deſign or draw forth briefly the cheif of them here. And then in the ſecond place to diſtinguiſh the diuretick Medicines as to the matter, which is almoſt in all of them only Saline, into certain Claſſes, and laſtly, to add thereto the more ſelect forms of preſcriptions in every Kind.

Part I.

3. *As to the Form.*

First therefore when the Blood becomes ſo craſs and tenacious by a fixed Salt with Sulphur and Earth incocted together and mutually combined, that the watrie Particles do not eaſily ſeparate from the reſt; Diureticks of that kind are behoveful, which may make laxe its cloſe joynting, and ſcatter abroad the *Serum*, which are rich in volatile or acid Salt: for ſuch Particles do chiefly diſſolve the Combinations enterd into by the fixed Salt. For as much as this diſpoſition is common both to the Fevour and the Scurvie in the former Diſeaſe, diureticks are chiefly proper, both the acid temperates of Vegetables, alſo of ſalt Nitre, of the Spirits of ſea Salt, of Vitriol *&c.* Alſo ſuch as are indued with volatile Salt, as the ſpirits of Harts Horn, of ſalt Armoniack, ſalt of Amber, of Vipers and of others of that kind which we reherſed before in the Claſs of Diureticks. In the ſcorbutick Diſpoſition when the Urine is both little and thick, the Juices of Herbs, and preparation both ſower and acid are of egregious uſe, alſo ſalt and ſpirit of Urine, of *Sal* Armoniack, Tartar *&c.*

1. *Saline diureticks.*

1. *What are requiſite in the too ſtrict joynting of the Blood.*

Secondly ſometimes the Blood does not retain long enough the *Serum* within its cloſe enfolding, but being obnoxious even to Fluxions or rather Coagulations, puting it away here and there plentifully in great abundance, ſtirs up Catarrhs or tumors in divers places; or elſe the Blood being habitually weak and alſo in ill diſpoſition, to wit, inclining to ſowerneſs, ſo far as that it is apt to coagulate its more thick Particles; therefore as the more thin are every where ſent away in the Circulating, and falling down upon the weaker parts, they cauſe now Cephalick Diſeaſes or Thoracious, now an *Aſcites* or *Anaſarca*. Moreover from a like cauſe the *Diabetes* doth ariſe as ſhall be declared by and by. But truly very many difficult Diſeaſes, which are imputed wrongfully to the Dyſcraſie of the *Viſcera*, do ariſe from this Cauſe; to wit, that the Blood being evilly tempered, and obnoxious to Coagulations, when it cannot continue the whole thred of Circulation; it puts away the *Serum*, too readily apt to go away, in divers places. In theſe caſes the Diureticks to be given ſhould be of that kind which does not ſcatter the Blood, but take away its Coagulations, as they are which are indued with fixed, volatile atd alchaliſate Salt, beſides ſuch as ſtrengthen or reſtore the ferment of the Reins as ſome ſulphureals and ſpirituals. To theſe Ends are Diureticks, Sulphureous and Mixt Salts, the Lixivials of Herbs, the Pouders of Shells, Salt and Spirit of Urine and *Millipedes* or hog Lice, horſe Raddiſh Roots, Parſly Seed, Nutmegs, Turpentine and its preparations, Spirits of Wine, the Virtue of all which is not to fuſe the Blood, and to precipitate the Seroſities out of its Maſs (acids do that chiefly, and in thoſe caſes more often hinder the *Diureſis*) but to diſſolve the Coagulations of the Blood, for the end that its cloſe joyning together recovering a whole intire mixtion, and being more expeditiouſly circulated thorow the Veſſels, it might ſup up again the *Serum* any where gone out of the Veſſels, or diſpoſed, and at length may deliver it to be ſent away by the Reins: by which means, according to both theſe allmoſt oppoſite ends of Healing, the Diureticks of every kind ſhould operate, and chiefly under what Forms they ſhould be diſpenſed, we ſhall now ſhew next.

Secondly what in the too lax

CHAP. II.

Part I.

CHAP. II.

The Kinds and Forms of Diureticks, also the Ætiology of the Chymical Preparations of them.

FIrst therefore, what belongs to the Saline Diureticks, ought to be referred hither, as we have often told you that Salts of whatsoever divers condition being commixed together, do mutually lay hold of one another, and by and by are joyned close together; and while they are so combined, other Particles, being loosned from the mixture do separate or fly away into Parts. This is planely perceived when the fluid or acid Salt is mixed together with the fixed or Alchalisate, also when the fluid or fixed with the Volatile or sharp. In truth all the business of all sorts of solutions and precipitations depends upon this only affection of Salts. Wherefore as the Blood and the Humours of our Body, abounds very much in Salt, and being wont to be variously changed by it from one State to another and for that cause a morbid Disposition to accrue, and moreover as divers sorts of Saline Diurericks are full of fixed, fluid, nitrous, volatile or Alchalisate Salt, there will be always need of great Discretion and Judgment of the Physitian, that the Saline Particles in the Medicine may differ from those in our Body. By what means this may be done, we shall declare by running thorow every kind of Diuretick Salts.

The divers states of Salts.

Their various affections.

Among the Diureticks imbued with acid Salt, the spirit of Salt or Nitre, also the Juice of Limons and Sorrel, white Wine, Rhenish Wine and Cyder, are chiefly and commonly noted, and very often perform that intention: for these do only fuse the Blood, and precipitate it into serosities, even as sharp things dropped into warm Milk. Notwithstanding this does not happen to all alike, nor to every one indifferently. In a healthful constitution or not very far from it, the Salt of the Blood is partly fixed and partly Nitrous, and partly Volatile; also in some Scorbutical and Hydropical People it becomes for the most part fixed. Wherefore in all these cases Diureticks indued with acid Salt are administred with success: but in Catarrhous affections, and in some Hydropical and Scorbutical, when the Saline fixed Particles of the Blood are carried into the Form of a stream, and the Volatile are depressed (as it often happens) sharp acetous Remedies do rather hurt than good; for as much as they do more pervert the Blood degenerated from its right Disposition, but rather in these cases, Medicines indued with a fixed or Volatile Salt, are of Use.

Diureticks repleni[shed with acid Salt.

For whom Convenient.

Forms and Diureticks which have an acid Salt for their Foundation.

Powders.

Take of Choice white Tartar pulverised of *Lapis Prunellæ* of each ʒiſs, of the Pouder of Crabs Eyes ʒj. The Dose is from ʒſs to ℈ij, in a fit Vehicle, repeated every sixth or eighth Hour.

Take of Vitriolated or Nitrated Tartar ʒij, Pouder of Egg-shells ʒiſs, Parsly Seeds or wild Carrot Seeds ʒſs, make a Pouder, the Dose ʒſs, after the same manner.

Take of the best Spirit of Salt ʒij, of Harts Horn burnt and poudered what will suffice to drink it up, make a Pouder, Dose ℈j to ʒſs,

Drinks.

Take of the Juice of Limons ʒij, of Water of Raddish Composit. ʒiſs, of Syrup of the five Roots ʒiij, make a potion,

Take of the Juice of Sorrel ʒij, of white Wine ʒvj, mingle them and make a Potion.

Take of compounded Water of Raddish ʒij; of Pellitory of the Wall ʒiiij, of

of the ſpirits of Salt ℈j, fifteen drops of the Salt of Tartar, fifteen grains of the ſyrup of Violets ʒß, make a Potion.

Part I.

2. Medicines indued with a fixed or lixivial Salt, are wont to be adminiſtred to move Urine, and it appears manifeſtly enough by the vulgar and empirical Medicines for healing dropſical people: For it is uſual in an *Anaſarca* and ſometimes in an *Aſcites* when the *Viſcera* or fleſhy parts do very much ſwell up by the aggeſtion of waters, to drink a *Lixivium* made of the Aſhes of Wormwood, or of Broom, or of Bean ſtalks with white Wine; from whence it frequently happens a very great plenty of making water to follow, and the Diſeaſe to be taken away. However I have obſerved that Medicine to have been not at all Diuretick to ſome, and rather to have encreaſed, than healed the Hydropick *Diatheſis*: If the reaſon of which be inquired into, it appears by what hath been formerly ſaid, that lixivial Salts do not fuſe or precipitate neither Milk nor Blood, and therefore they are not by their proper virtue Diuretick; but notwithſtanding that effect ſometimes follows, for as much as fixed ſalt being copiouſly taken, deſtroys the Energie of the acid or coagulative Salt being mighty in the Blood; becauſe that the Blood, when before, incontinent of the *Serum* and too apt to be fuſed did extude it in divers places, by the coming of the fixed Salt might recover its due conſiſtance, and therefore drinking up again the extravaſated *Serum*, and carrying it continually to the Reins, cauſed a plentiful *Diureſis* or evacuation by Urine.

Diureticks indued with fixed Salt.

For whom convenient.

2. *Forms of Diureticks which have a fixed Salt for their* Baſis.

Their forms.

Take of the ſalt of Tartar or of Wormood ʒij, of Coral calcined white ʒjſß, of Nutmegs ʒß, make a Pouder, the Doſe is ʒß to ℈ij.

Take of the Tincture of the ſalt of Tartar ʒjſß to ʒj, Rhadiſh water *Compoſit.* ʒjſß, mingle them and let it be given in a draught of poſſet drink with the roots and ſeeds of the great Burdock boiled in it.

Take of the *Deliquium* of the ſalt of Tartar (whilſt the tincture is extracted) flowing under, and of Wine impregnated with Sulphur ℈ij to ʒjſß, of white Wine ʒiiij to vj, of the ſyrup of the five Roots ʒß, mingle them and make a draught to be repeated twice or thrice in a day.

Take of the Aſhes of the twigs or buddings of the white Muſcadine Grape ℔ß, Nutmegs ʒij, pour them into ℔ijß, of Wine or Rheniſh Wine, let it ſtand warm and cloſe ſhut for a days ſpace, then ſtrain it and keep it for uſe. The doſe is ʒvj, twice or thrice a day.

Flints made hot in the fire and quenched in white Wine or ſtale *March* Beer. Drink of the Liquor vj or ʒviij, twice a day.

Take of the water of quick Lime ʒiiij to vj, of the Tincture of the ſalt of Tartar ʒj to ʒjſß, make a draught to be taken twice or thrice a day.

Diureticks indued with volatile Salt.

3. For the ſame reaſon as fixed Salt, ſometimes alſo volatile Salts is adminiſtred with ſucceſs to move urine in a ſharp Dyſcraſy of the Blood *viz.* for that its Particles being admitted into the Blood do deſtroy the prepollency of the fluid Salt in it; becauſe that the blood recovering a due mixture being made free from coagulation and Catarrhs it reſorbs or ſucks up again whatſoever of the *Serum* is gone forth of the Veſſels, and delivers what is ſuperfluous to the Reins to be ſent away by the Ureters. But notwithſtanding in the mean time Medicines prepared out of volatile Salt, becauſe they have Particles ſomewhat fierce and elaſtick, when they amend the diſpoſition of the Blood they diſpoſe what is ſuperfluous of the *Serum* ſometimes to be purged away as much by a *Diaphoreſis* or evaporation by ſweat as by a *Diureſis* or evacuation by Urine. To this Claſs of diuretics not only the pure unmixt volatile Salt drawn forth of the Animals or Minerals by diſtillation, but the integral parts of the living Creatures and Vegetables (of which ſort are the powders and extracts of inſects and ſharp vegetables) ought to be referred.

Wherefore they help.

Part I.

Thier Forms.

3. *Forms of Medicines which have volatile Salt for their* Basis.

Powders. Take of the salt of Amber, of the salt of the purest Nitre of each ʒij, make a powder, the Dose is from ℈j to ʒß, in a fit Vehicle.

Take of the flowers of salt Armoniack, of mineral Crystal of each ʒij, mix them the Dose ℈j, to ʒß, in a spoonful of Compounded Radish water. The Salt of urine is given after the same manner.

Take of the powder of Bees ℈j, of Lovage seeds ℈ß, make a Powder, let it be given in a spoonful of distilled Water.

Potions. Take of the spirits of Urine ℈j to ʒß, of the water of Radish Composit. ʒj to ʒjß, of the water of Juniper ʒiij, mix them, make a draught. Spirits of Tartar are exhibited after the same manner in a double Quantity.

Pills. Take of *Millepedes* prepared ʒij, of the flowers of salt Armoniack ʒß, of Nutmeg powdered ʒß, of Venice Turpentine what shall suffice, take four Pills twice in a day.

Take of the powder of Bur-dock seeds ʒij, of wild *Daucus* ʒj, of the salt of Amber ʒj, of the oyl of Nutmegs ℈ß, of *Capivius* Balsom what will suffice, make a Mass, form it into little Pills, of which take in the evening, and in the morning iiij.

Apozem. Take of the Roots of Chervil, Parsly, Fenil, *Eringo*, Cammock or Restharrow of each ʒj, of the leaves of Saxifrage, of Clivers, or goose Grass, of each j M, of Cummin seed, of stone Crop, of each M ß: of Juniper Berries ʒvj, boyl them in Spring water ℔ iiij, till half is consumed, add to it of Rhenish Wine ℔j, of the best Hony ʒij, make an Apozem the Dose ʒvj, twice a day.

Distilled water. Take of fresh *Millipedes* or Hoglice ℔ij, of the leaves of Cleavers, Chervil, Saxifrage, golden Rod, of each Mij, of wild radish roots ʒvj, of Nutmegs ʒj, of Juniper berries, wild Carrot seeds, of each ʒij, being cut and brused pour them into the Whey or *Serum* of milk made with white Wine ℔viiij, distil it in the common Stills and let the whole liquor be mixed together. The Dose ʒiiij, twice or thrice in a day.

Expressions. Take of fresh *Millipedes* washed to the number of 40 or 60 of Nutmeg ℈ß, let them be brused together and put them iuto the distilled water of Saxifrage ʒiiij, make an expression and let it be drunk.

Take of the Leaves of Chervil, of Parsly, Alexanders, of each M iij, let them be brused together and put into white Wine ℔jß, squeese it forth very hard, let it be kept in a Glass, the Dose ʒiiij, twice in a day.

Tinctures. In like manner the Tincture of *Millipedes*, of Bees, of Grashoppers, or of *Cantharides* dryed, the Tincture of salt of Tartar: given from 15 or 20 to 30 Drops in a fit Vehicle.

Diureticks indued with a nitrous Salt, 'Tis plane from the Figure, Colour, Tast, and other properties, and accidents, that Nitre is a certain *genus* of Salt. However it is divers from any other Salt or the condition of saline Particles, and is neither acid, nor fixed, or volatile, but a state as it were in the middle between them. For so much it participates of volatile Salt, as whilst it is made, it must be joyned to the lixivial and fixed salt with the Ashes, that it might obtain a certain concretion, further when it is melted, by some Sulphur cast in it, by and by it is inflamed and flies away: But it so much communicates with fixed Salt, as being melted in the Crucible, it suffers a continual fusion, and perhaps perpetual, without any great loss of Parts or Particles. In truth Nitre is that whereby all the Plants do flourish, all living Creatures live and breath, and the flame or all sublunary Fire is enkindled and sustained, as we have shewed more largely in another Tract, which it will not be needful to repeat here.

The reason of its effects. But as to our present purpose, it is commonly enough known that the salt of Nitre doth refrigerate the Blood, and strongly move Urine: but yet the Reason of either effect doth not so clearly appear, because Nitre is so far from containing cold carrying Particles in it self, that on the contrary nothing can be more igniferous

igniferous, as may be perceived in Gunpowder, and if it be diſtilled, flame, rather than vapour or fume will ſeem to come into the Recipient: yea the diſtilled *Stagma* like actual Fire burns or corrodes all bodies whatſoever which are put to it. Neither is it leſs to be wondered at how this, whoſe nature is ſo fiery, ſhould ſo moiſten the Blood, and fuſe it into aquoſities, for the provoking evacuation by Urine. Part I.

That I may propoſe our Conjectures concerning theſe things, I ſay that Nitre does help to produce theſe effects in a twofold reſpect; *viz.* for as much as it is a Salt ſomewhat a kin both to the fixed, and to the volatile, and for as much as it is a fire exciter: As to the firſt we have obſerved Nitre (even as alſo fixed and volatile Salts) being put into Milk, to hinder or take away its coagulation; in like manner alſo warm blood being poured to this as well as to thoſe is preſerved from coagulation and diſcolouration. Wherefore indeed the Particles of Nitre, being taken inwardly; keeps whole or reſtore the mixtion of the Blood; becauſe truly they will hinder or take away its fuſions and coagulations, from which heats and the *Iſchuria* or ſtoppage of the paſſage of the Urine, do very often ariſe.

But moreover Nitre, as much as it is fiery, being taken inwardly refrigerates the heated Blood and moves Urine: for that (as we have formerly hinted) enkindling more by its coming the flame of the Blood, before troubled, and intermixed with fumes, it renders it more clear and pure, and for that cauſe more gentle; and ſo as the Blood, before troubled, whilſt that it burns more clearly by reaſon of the Nitre, is more laxed in its cloſe joynting; the ſerous Particles are more eaſily extricated from the more thick, and more plentifully go away.

4. *Forms of Diuretick*s *which have Nitre for their* Baſis.

Take of prepared Nitre ʒij, of Barly water with Knotgraſs roots, and candied *Eringo* roots boyled in it ℔ij, of the ſyrup of Violets ʒij, mingle them. The doſe is ʒiiij, twice a day. *Powders.*

Take of *Sal Prunellæ* ʒij, of ſugar Candy ʒj, make a powder to be divided into ſix parts, take one in ſome convenient liquor thrice in a day.

Take of *Sal Prunellæ* ʒiij, of ſalt of Amber ʒij, make a powder, Doſe ʒß, thrice in a day.

Take of *Sal Prunellæ*, of Crabs eyes, of ſalt of Wormwood, of each ʒij, mingle them, the doſe ʒß, thrice a day.

5. It is vulgarly enough known alſo that teſtaceous or ſhelly, and ſome ſtony powders indued with an Alchalizate or petrifying Salt do ſometime promote an evacuation by Urine or the *Diureſis*. For that in great ſtoppages of the water, the powder of Egs ſhells, of the claws or eyes of Crabs is a preſent remedy to ſome. If the manner and reaſon of whoſe working be inquired into, it may eaſily be manifeſted that theſe Medicines do not fuſe or ſcatter, nor ſenſibly precipitate the Blood. Therefore it may be ſaid that theſe are ſometimes Diuretick in an acetous dyſcraſy of the blood and humours, for as much as they bind and reſtrain the acid Salts by their combination, to the end that the Blood, being free from fluxions and coagulations, might ſup up the extravaſated *Serum*, and transfer it to the Reins. *Diuretick*s *indued with Alchalizate Salt*.

5. *The Forms of diuretical Medicines whoſe* Baſis *is an Alcaliſate Salt.* *Their Forms.*

Take of Egſhels powder'd ʒß to ʒj, let it be given in a draught of white Wine or poſſet drink or of diuretick decoction twice in a day. *Powders.*

Take of the powder of Crabs claws or Crabs eyes ʒij, of the ſalt of Amber, of Nitre of each ʒj, of Nutmegs ʒß, make a powder, the Doſe ʒß to ℈j, in a fit Vehicle.

Or the aforeſaid powder with as much Venice Turpentine as will ſuffice to make little Pills, the doſe iij or iiij, morning and evening. *Pills.*

Part I.

Sulphureous and ſpirituous Diureticks.

Not only ſaline but alſo ſome ſulphureous and ſpirituous Medicines, are rightly placed in the company of Diureticks, for as much as they produce that effect. Very many reſinous Gums as chiefly Turpentine, and preparations out of them, oyles of Juniper, of Nutmegs, of Wax, and drops of other fat things being taken inwardly for the moſt part provoke abundance of Urine, and imbued with a ſmell like Violets. I have known that in ſome Hydropical, and Scorbutick people ſpirit of Wine, and hot waters, yea and good Wine plentifully drunk hath provoked a *Diureſis*: the reaſon of all which is, becauſe that the Blood being weak or waxing ſower, or by reaſon of the defect of its fermentation, or through the power of the acid and coagulative Salt, if not lively enough nor equally circulated, as that it may contain within it ſelf the ſuperfluous *Serum*, even till it may deliver it over to the Reins, the aforeſaid remedies for as much as they keep whole the mixtion of the Blood, or reſtore its weakneſs, they conduce to the promoting the *Diureſis*.

Forms of them. Diſtilled waters.

Take of the Berries of Ivy, Juniper, and Laurel freſh gathered of each ℔ß, of wild Carrot ſeeds ʒiiij, of Nutmegs ʒij, let them be all bruſed and put into a glaſs retort, with the beſt Venice Turpentine ℔j, ſpirits of Wine rectified ℔iiij, let them be diſtilled in a Sand furnace with a moderate heat till they are dry, having a care of an *Empyreuma* or letting them taſt of the fire, and you will have a Spirit, and a yellow Oyl, either of them egregiouſly Diuretick: the Doſe of the Spirit ʒj to ʒij or ʒij, of the Oyl ℈ß to ℈j, in a fit vehicle.

Tinctures.

To the *Amalgama* remaining in the retort, pour of the Tincture of ſalt of Tartar ℔j, let them digeſt for many days cloſe ſhut in the ſand Furnace, that a red tincture may be drawn forth. The doſe of which is ℈j to ℈ij or ʒj in a convenient vehicle.

Spirit and Oyl.

Take of *Millipedes* prepared ʒiiij, of Nutmegs ʒj, pour on them of the pureſt ſpirit of Turpentine, and of the tincture of the ſalt of Tartar of each ʒvj, diſtil them in *Balneo* with a gentle fire, and you ſhall have a Spirit, Oyl, and *Deliquium* of ſalt of Tartar, every one of them notably endued with a diuretick Virtue.

The Reaſons of ſome certain Preparations.

1. Sal Prunellæ *or Mineral Cryſtal, which is only purified Nitre.*

Sal Prunellæ.

TAke of ſelect Nitre what you pleaſe, diſſolve it in ſpring water or rain water, boyl it a little, and put it into a deep glaſs Veſſel in ſome cold place to be Cryſtallized: Let the whiteſt only and pureſt Cryſtals be ſelected, which muſt be reduced to the higheſt purity by frequent Solutions and Cryſtallizations, which at laſt being fuſed in a Crucible, and poured forth into a ſilver Veſſel, becomes a moſt white ſtone. This being pulveriſed, the Doſe is ℈j to ʒß or ℈ij. It cools the Blood being hot, and moves Urine.

The reaſon of it.

This preparation is made for that end, as the nitrous Particles may be ſeparated as much as may be, and be pure and clear from the fixed Salt, and may be concreted by themſelves into Chryſtals; for that when Nitre is firſt made and elixiviated from the Earth, its Particles are unable to grow together or to be Cryſtallized ſo, which makes a neceſſity, that the nitrous *Lixivium* ſhould be largely lixiviated with Aſhes, and impregnated with fixed Salt, whereby the nitrous Particles being partly united with the lixivials, and partly by the intervention of theſe; the waters extruded from the Pores, acquire a certain concretion or growing together: Wherefore when the Body of ſalt Nitre is formed by this means, the Particles of the fixed Salt are to be waſhed away from it as much as may

may be, by frequent ſolutions and Cryſtallizations, whereby it may be rendred more pure for the uſe of Medicine.

2. *Spirit of Nitre.*

Spirit of Nitre.

Take of the pureſt Nitre ℔j, pouder of Bricks ℔ij, let them be well beaten and mixed together, and put into a Glaſs or earthen retort made faſt and defenced and diſtilled in a reverberating Furnace by a fire gradually increaſed. The red fumes make the receiver to ſhine as it were with a certain flamy colour, and being condenſed, they make an acid and highly corroſive *Stagma*. The Doſe is drops iiij to vj in a fit Vehicle.

Its Ætiology.

Although Nitre being mixed with Sulphur, is fixed preſently by any inkindling, and breaks forth into flames; yet being deſtitute of that, it may be melted in a Crucible, or diſtilled in a Retort without any deflagration. The powder of Bricks is added, that when the Salts are fuſed by the Fire, they may not mutually lay hold of one another and link themſelves together, but being divided and drawn one from another, they may be driven forth from their ſubject by the force of Fire.

The melted Nitre retains its inflammable virtue, but the Liquor being diſtilled, will rather put out the fire than kindle it: For if it be mixed with Sulphur, that mixture will hardly be made to burn, or leſs than Sulphur by it ſelf. The reaſon of which is, becauſe the nitrous Salt having ſuffered a fluor or flux, is altogether altered from its firſt ſtate, and gets almoſt a like acetous diſpoſition, as other Salts ſuffering a Flux; yet an acid *Stagma* is drawn out of the Sulphur, which rather deſtroys the Fire, than that it ſhould be inflamed by it.

3. *Spirit of Sea Salt.*

Spirit of Sea Salt.

Take of Sea Salt fuſed and powdered ℔j, of Bricks groſly powdered ℔iij, beat them together and mingle them; then add of greater pieces of Bricks to ℔ß, let them be well mixed and ſet faſt in a Retort, and diſtilled in a Reverbatory, with a moſt ſtrong Fire for twenty four hours: Rectifie the diſtilled Liquor in a glaſs Cucurbite by the heat of Sand, drawing off the phlegm or watry part. The Spirit will remain in the bottom of a yellow or little greeniſh colour; and of a very grateful ſmell and taſte.

The Reaſon.

This Salt is very difficultly driven into an acetous Liquor, becauſe its Particles being more Saline than any other minerals, to wit, Vitriol, Nitre, Alume, and moſt ſtrictly combined together, and are not eaſily diſſociated one from another by themſelves, or may be pulled away from the embraces of the Earth; leſt they ſhould flow together, the powder of Bricks is mixed with it in a three fold quantity: and moreover greater pieces of Bricks is thought good to be interpoſed, that the Maſs to be diſtilled being made hollow as it were with holes, it might be every where pervious to the Fire. Nevertheleſs in the diſtilling, the Salts being fuſed by the fire moſt often flow together, that afterwards they cannot be driven forth by any force of fire.

The thing appears to be ſo, becauſe if by an applied Artifice this Cohæſion of the Salt among themſelves and with the Earth is broken off, they may by a very eaſy work be forced into an acid *Stagma:* for example.

A more compendious manner of it.

Take of the ſpirit of Vitriol not rectified ℔j, pour this into the glaſs Retort to the Sea ſalt calcined and pulveriſed, and by and by diſtil it in Sand: the ſpirit of the Salt as it were driven away from the other moſt eaſily aſcends, the ſpirit of Vitriol poſſeſſing its ſeat, *viz.* this being more heavy and ſtrong, and being at once deprived, and greedy of a terrene habitation, drives the other from its ſeats, and invades them.

4. *Spirit*

Part I.

4. *Spirit of Urine.*

Spirit of urine. Take of the Urine of a ſound man that drinks Wine, what you pleaſe, place it in a Cucurbit with a blind Head that it may putrefie in Dung for a Month, then diſtill it in ſand: The diſtilled Liquor being rectified in a deeper Cucurbit, exhibits a Spirit and volatile Salt. This operation is more compendiouſly performed, if the freſh Urine be evaporated to the fourth part remaining, to wit, that the ſaline Particles, the phlegm exhaling, may be agglomerated more thickly with the ſulphureous and terreſtrial. To this ſettlement ſet faſt in a Cucurbit, let there be poured a *lixivium* of Aſhes, or of the Salt of Tartar, or a ſolution of quick Lime, then being put in an Alembick; diſtill it in a ſand Furnace, by a very eaſie work you will have the Spirit and volatile Salt, which are depurated and ſeparated by rectification.

The Ætiology. The Reaſon of theſe proceſſes is this: For that the Urine conſiſts of a twofold Salt, *ſcil.* both nitrous and volatile, together with a great deal of Sulphur and Earth, the Particles of the volatile Salt (whilſt that the mixtion is whole) are ſo entangled and ſtrictly combined with the other Salts, and the other more thick elements, that the Spirits cannot break forth, nor be pulled aſunder or ſeparated by the force of Fire, notwithſtanding after that by a long putrefaction, the mixture of the Liquor is laxed, the ſaline volatile Particles at length extricating themſelves from the reſt, do firſt of all aſcend in the diſtilling. Moreover the ſame effect alſo more eaſily ſucceeds, when the fixed Salt being diverſe from the nitrous, is poured in; becauſe whilſt the Particles of this infuſion are laid hold on by thoſe of the other, the volatile Salt being ſlipped forth from its Chains eaſily goes away. Hither may be referred what we advertiſe hereafter, concerning the diſtillation of *Sal* Armoniack.

5. *The Tincture of Tartar.*

Tincture of Tartar. Take of the pureſt ſalt of Tartar ℥vj, let it be melted, and let it flow in a Crucible, until it acquires a blewiſh or almoſt greeniſh Colour, then pour to the ſame being pulveriſed while it is hot, and placed in a firm Matrace with a long neck; the rectified ſpirit of Wine till it is covered iij or iiij fingers breadth, and let it be digeſted in a ſand Furnace with a ſomewhat ſtrong Fire for many days, until the Tincture is extracted. Becauſe that by long digeſtion the ſpirit of the Wine acquires a red colour, it is for as much as the Particles of the fixed Salt, being after a ſort exalted, are united to the vinous Sulphur. In the mean time, the remaining ſalt of Tartar being diluted by the phlegm of the Wine ſubſiding below into a *deliquium*, and flowing from beneath, goeth away by it ſelf; which is far better than the common oyl of Tartar, for as much as it participates of the Wine, Sulphur, and in ſome caſes where there is need of a diuretick Lixivial, it is a very laudable remedy. The Doſe is ℈j to ℈ij or ʒj. The Tincture is given from ʒj to ʒjſs, or ʒij.

The Reaſon. The Tincture of the ſalt of Tartar by reaſon of the conjunction of the Salt and Winy Sulphur, is imbued with a moſt fragrant taſte and odor. If you ſhall diſtil the Liquor to the midſt, the remaining part retains more of the Salt and Sulphur in it ſelf, but leſs of the vinous Spirit; but the Spirit being drawn off and poured upon freſh ſalt of Tartar, if it be digeſted, for as much as it is wanting of the Sulphur when it is united with the Salt, it does not eaſily acquire a Tincture.

Truly that there is in the ſpirit of Wine a ſulphureous part, diſtinct from the ſpirituous; I learned from this Experiment.

Sulphur or Oyl of Wine. Take of the ſharpeſt ſpirit of Vitriol ℔ſs, of the rectified ſpirit of Wine ℔j, mingle them in a glaſs retort, and diſtil them in a ſand Furnace; until the Liquor (which firſt ſeems homogeneous) being drawn off, a copious black thick ſettlement remains in the bottom: Let this Spirit be again poured back upon the *Caput mortuum*, and let the diſtillation be repeated with two or three Cohobations; at length you ſhall have two diſtinct immiſcible Liquors, *viz.* one an acid-ſpirituous ſubſiding below, and the other a moſt clear oyly ſwimming above it; which without

without doubt is the moſt pure unmixed ſulphureous part of the Wine, ſeparated and remaining by it ſelf, whilſt the ſpirituous part is wedded to the acid Salt. Part I.

6. *Salt of Amber.*

Take of the whiteſt Amber pulverized ℔ß, let it be diſtilled in a Glaſs Retort, either with a moſt ſtrong heat of Sand, or a light Reverbatory: Firſt, there will aſcend a phlegm and yellow Oyl with a little ſpirit; then the volatile Salt will be ſublimed into the neck of the Retort, and ſides of the Receiver: And laſtly a black Oyl will come forth before it aſcends. This ought to be taken away, and the Receiver to be changed, leſt the Oyl be polluted by it.

At firſt, white Salt of a very grateful odor and ſavour, unleſs it be kept in a Veſſel very cloſely ſhut, in a ſhort time becomes yellow, and then red with a very ſtinking ſmell: The cauſe of which is, for that this Medicine contains much of Sulphur in it ſelf, whoſe Particles whilſt the Salt hath dominion, being ſubjugated and involved with others; are altogether obſcured, but afterwards being laxed they emerging from their binding mixture, and overtopping the others; they for the moſt part ſhew their excellency to our Senſes. Its Doſe is ℈ß to ℈j, the beſt way of keeping and of giving the ſalt of Amber, is to mix it with double the quantity of the pureſt ſalt of Nitre. *The Reaſon.*

Chap III.

Of the too much Evacuation by Urine, and its Remedy; and eſpecially of the Diabetes *or Piſſing Evil, whoſe Theory and Method of Curing, is inquired into.*

THe *Diabetes* was a Diſeaſe ſo rare among the Ancients, that many famous Phyſicians made no mention of it; and *Galen* knew only two ſick of it: But in our Age given to good fellowſhip and guſling down chiefly of unallayed Wine; we meet with examples and inſtances enough, I may ſay daily, of this Diſeaſe. But yet as familiar as it is, and though it be known as to its Type, its cauſes and formal reaſon notwithſtanding, is almoſt altogether unknown. That I may be ſo bold to Philoſophize, or rather to conjecture concerning theſe; we will firſt of all give you a deſcription of this Diſeaſe, as to all or the chief *Phænomena* of it: Then we will endeavour diligently to find out from the fault, of what part or humour every of them ſingle do ariſe. *The* Diabetes *formerly rarely, and not yet well known.*

Diabetes is called ſo from Διαβαίνω *Tranſeo*, or paſſing through too ſwift a paſſage of the matter that is drunk, alſo a *profluvium* or thorow-flux of Urine. Thoſe labouring with this Diſeaſe, piſs a great deal more than they drink, or take of any liquid aliment; and moreover they have always joyned with it continual thirſt, and a gentle, and as it were hectick Fever. But that as many Authors affirm the drink to be little or nothing changed, is very far from truth; becauſe the Urine in all (that I have known who hath hapned to have it, and I believe to be ſo in all) very much differing both from the drink taken in, and alſo from any humour that is wont to be begot in our Body, was wonderfully ſweet as it were imbued with Honey or Sugar. The occaſion of the foreſaid error (as I ſuppoſe) was the colour *Its deſcription.*

Part I.

colour of the Urine, which always appears crude, and watry as of those labouring with the *Pica* or with the Dropsie. That we may carefully search out the reasons of these Symptoms, we must first inquire from whence so quick and copious an excretion of Urine comes, and then we will proceed to the shewing of the remaining Reason of this Disease.

Its cause is not the attraction of the Reins.

It no way pleases us what some do assign for the cause of the *Diabetes*, the attracting force of the Reins: because the Blood is not drawn to the Reins but driven thither by the motion of the Heart. Further neither doth the *Serum* seem to be drawn or emulged from the Blood washing thorow them, but to be separated (as we have already more clearly shewed) partly by straining, and partly by fusion or a certain kind of precipitation: wherefore we believe the *Diabetes* to be rather and more immediately an affection of the Blood than of the Reins, and to take from thence its origin, for as much as the mass of Blood is as it were melted, and is too copiously fused into serosity: which easily appears truly from the quantity of the Urine increased into so great immensity, which cannot proceed but from a melting and consumption of the Blood. Wherefore also the remaining Blood, its *Serum* going away so plentifully, becomes more crass or thick, and more apt to be coagulated, as may be argued from the swift working Pulse: for the Heart is therefore more rapidously moved, that whilst it exagitates the Blood more than usual, it might preserve it from Coagulation. Further that the fluidity of this, apt to be dangerous by reason of the too great loss of the serous Liquor, might be continued, potulent matter is most plentifully taken in an huge thirst provoking to it, and besides the Humours that are within the solid parts are supped up from the Blood, yea their fillings are melted for the reparation of this; hence it is that those labouring with this Disease are exceeding thirsty, and quickly grow lean.

But rather a Deliquium of the Blood.

The Conjunct cause is chiefly in the Blood.

Therefore, that I may endeavour to shew the conjunct cause and formal Reason of the *Diabetes*, I am led to believe the *Crasis* or mixtion of the Blood to be so laxed and as it were dissolved that the watry Particles cannot be contained by the more thick, bat that they quickly sliding from their embraces, and being imbued with saline Particles, do run forth thorow the most open Passages of the Reins. But in the mean time other humours both from without and from within for the moystning the Blood, and hindring it from coagulation, are conveyed into it; and the *præcordia* are urged even with a mighty force into a more rapid motion.

Sometimes partly in the Reins.

But besides we think the Reins sometimes to be some part of the conjunct Cause, for that their ferment is wont sometimes to be so vitiated, that it doth not preserve the Blood by any influx of lixivial Salt, in due mixtion, and fluidity, for the cause that the *Serum* might be separated from it by percolation only; but sometimes it happens from an acid Salt laid up in the Reins, that the Blood is precipitated whilst it passes thorow them, as it were by a certain Coagulation or runnet into a copious serosity, which is by and by sent away by the Ureters. Hence it is to be observed that a plentiful and limpid Urine is made by most of those obnoxious to the *Nephritis* or Gravel, in a violent paroxysm or fit. The cause of which is, that the acid Humour, delated thither by the nervous Pipes, (as we have somewhere shewen) and exciting Pain, doth first fuse the Blood sliding into the Reins, and causes the going away of a more plentiful *serum* from it.

But it is not improbable but that a plentiful διάχρησις or excessive evacuation by Urine, may in a sort proceed from an evil conformation of the Reins, for as much as their lympathick little hollow *Tubuli* being too ample, and open, they receive too readily the serous Liquor, and transmit it too swiftly without any *Remora*, so that therefore its greatest quantity runs forth into Urine. But in truth as I may grant these little Tubes sometimes and chiefly in those troubled with the Stone or gravel, to be too open, yet for that cause there should be rather purged forth a bloody then a copious Water. And indeed we think a bloody Urine cheifly to proceed from some such Cause. Moreover when a copious and bloody Urine comes together, we judge a dyscrasie of the Blood to concur with an evil Conformation of the Reins, as shall be declared by and by in a notable case, of a certain sick person.

In the mean time as it is not to be doubted that the cheif and most frequent cause

cause of the *Diabetes* consists in the Mixtion of Blood being too dissolute and lax; so also by the like Reason, the small *Diuresis* or lesser than ought to be also very often depends upon the too strict, and as it were close joynting of the Blood. Moreover we may opportunely inquire whether that the total suppression of the Urine dos not sometimes proceed from such a cause? For though it is commonly enough known, that the cause of the *Ischuria* or more strong and pertinacious stopping of the urinal Passages, being most often placed below the Reins, depends altogether upon the urinarie pipes being wholly stopped, and when I my self have opened many dead by the Urines being wholly suppressed, I found in all the invincible cause of Death to have been an obstruction of the only Ureter a little before open (the other being long time shut up) by a Stone newly got in. Yet the most learned Doctor *Riverius* shews two cases of sick people in whom the *Ischuria* or total suppression of Urine, and that for many Days was cured by Phlebotomie only; and therefore he ascribes the Cause of the Disease to the Emulging Veins being above measure distended, so that they could not contract themselves for the expulsion of the *Serum*, even as it may be observed every where in the urinal Bladder, which being very full, is not easily composed to the making of Water. But indeed as we give belief (as 'tis likely) to these Histories, yet we ought not to assent to the Ætiology. Because that is not the office of the Emulging Veins, which that famous man hath assigned them, for not the Veins, but the Arteries constantly convey the *Serum* together with the Blood, without any danger of hardness or plenitude of Urine; but as the *Serum* does not quickly run forth into the open Passages, the reason seems to be, that the Mass of the Blood being too strict, and compacted hardly lets go out of its Bosome the watry liquor intimately mixed with it.

Part I.

As this disease often arises from the close joynting of the Blood being too dissolute,

So the suppression of the urine sometimes is from the too strict joynting of the Blood.

Hither may be referred the Anatomical Observation lately made on the dead Body of the Reverend Bishop of *Chester* when as that most illustrious Lord, being a long while troubled with the Stone, at last by a continual suppression of Urine had yeilded to Death, presently all did presume, the cause of Death to have been the Ureters being wholy stopped up by a Stone or gravelly matter, but by a disquisition made through a most accurate Anatomie, not any obstruction at all in those Pipes, or impediment of the Urine could be found. The like anatomical observation was related to me by that most learned man, Doctor *Lower* not long before made by himself, where the *Ischuria* being deadly had not left any signs of it about the urinary Vessels: Hence it is easy to divine, for besides the reins were whole and sound, that the cause of this disease was altogether in the too great Concretion and Compaction of the Blood.

This is confirm'd by anatomical Observations.

But to return from this diversion after having unfolded the conjunct cause, and the Reason of the *Diabetes*, we will proceed to the searching out its procatarctick or more remote causes. Therefore if it be inquired into, from whence the joynting or compaction of the Blood becomes so loose and lax, and apt to melt into serosities; we say of this even as of Milk, that its fusion proceeds frum this, for that as in its Mass Salts of a divers nature do agree, or are associated, the other particles (which separated themselves from them of course, and are conteined in the mixtion) being freed from the Saline, presently go away into Parts. If that it shall be further inquired into, from whence those Salts come, by whose private combination we suppose the mixtion of the Blood to be loosed, and its fusion introduced; we need no long search for them: for it planely appears, that there is naturally in the bloody Mass, fixed and volatile saline Particles, to which if at any time an acid Salt doth plentifully come, or obtains a flux, it will easily excite the aforesaid Affection. Hence it is that Rhenish Wine, Cyder, and acid Liquors being drunk provoke a more plentiful *Diuresis* or Evacuation by Urine; therefore also in some sickly People whose Blood abounds in an acid Salt, Medicines indued with a fixed or volatile Salt are wont to move the Urine. Neither doth this Affection still happen only from things taken, but from the humours produced within. It is observed that many obnoxious to Convulsive affections, before or after the paroxysms do make a great plenty of limpid, or clear watry Urine, the cause of which certainly is, for that the recrements or superfluities of the Blood and nervous Juice being heaped up in the solid parts, whensoever they being degenerated into a sowerness, shall swell up and flow back again upon the Blood, they induce its fusion, and for that reason a flux of Urine.

The procatartick Causes of the Diabetes.

They are first acid humors happening to the Blood, and fusing or precipitating it after the manner of Milk.

Part I.

Wherefore when there is ſuch a conſtant, and habitual profuſion of Urine, nothing can be more likely ſaid than that the excrementitious humours being ſent away into the ſolid parts, and from thence after they had there contracted a fowerneſs being returned into the Blood, they fuſe or melt its Liquor into too much ſeroſity, and for that reaſon provoke ſo continual, and immenſe excretion.

The ſame kind of acid Humour chiefly from the nerves and nervous Stock.

But we deſervedly aſcribe the chiefeſt part of this evil to the Nervous Juice, for as much as whenſoever this departs from a right *Craſis* or diſpoſition, as we have elſe where ſhown, it becomes very malignant and deadly both to the other Humours and to the ſolid Parts; wherefore by this being depraved the mixture of the Blood alſo is chiefly in danger to be perverted. But we may well argue that the nervous Juice is depraved, becauſe in the *Diabetes* the animal Spirits do very much languiſh, and preſently all nutrition is fruſtrated.

Hence ſpaſmodick Affections oftentimes preceed the Diabetes.

Further, which may notably confirm this opinion, I have obſerved in many obnoxious to this Diſeaſe by intervals, that a little before they have fallen into a flux of Urine, they have ſuffered wandring pains, and corrugations of the nervous parts in the whole Body, ſometimes with ſtupor or ſenſe of pricking, ſometimes with frequent Convulſions, and little leapings of the tendons, and other perturbations and inquietudes of the Spirits: being indeed a manifeſt ſign, that the Liquor watering the nervous Fibres degenerating from its *Craſis*, and being full of feculencies doth irritate the Spirits, and drive them into irregularities. Then afterwards when the recrements and ſuperfluities of the nervous juice overflowing into the Maſs of Blood from an ariſen Flux cauſe a *Diabetes*, the aforeſaid ſymptoms ceaſe, but with a languor of the Spirits, and a failing of ſtrength ſucceeding.

How the Diabetes *and the Dropſy differ.*

The *Diabetes* is commonly called the Chamber-pot Dropſy, and ſome affirm either the Diſeaſe to be indeed the ſame, and to have the ſame cauſes, and formal Reaſon, and the ſymptoms only to be varied as to the manner of the ſerous excretion; to wit, that the Blood in either being alike affected not able to contain the *Serum*, and being conſtrained to ſpue it forth from the Arteries, in the one pours it forth into the habit it ſelf of the Body, and Cavities of the *Viſcera*, and in the other, puts it aſide in the Reins abundantly to be carried away by the Ureters. But truly if the buſineſs be more narrowly conſidered, there will be found a notable difference between theſe two Diſeaſes. For the *Anaſarca* takes its original for the moſt part firſtly from hence, becauſe the Blood being imbecill, and too frigid is not enough enkindled, and heated, that it might continually concoct the Chyle that is carried to it, and aſſimilate it, and ſo volatilize it, as thereby it might be conteined in its boſome in the Circulation; but there is a neceſſity to ſpue this forth in all places together with the ſerous juice, and to leave it neer the *Interſtitia* of the Veſſels: then afterwards the Diſeaſe growing grievous the blood is not only made weak by Crudities, but becoming degenerate in its complexion is obnoxious to fluxions, and to Coagulations, and for that cauſe begets ſerous humours more plentifully, and pours them forth upon the undue parts, more impetuouſly. But on the contrary in the *Diabetes* the Blood is enough, yea to the utmoſt hot, and too much enkindled and concocts ſwiftly, and beyond meaſure the Chyle is carried to it: yea it melts the ſolid Parts, and ſups up their meltings, carries them about with it thorow the Veſſels, and boyls or cooks it more then enough; but when as by reaſon of the meeting of Salts the *Compages* or conſiſtence of the Blood is thorowly diſſolved, and fuſed into ſeroſities, portions being ſeparated within the reins, whatſoever are able to break away, run forth by the Ureters. If any Diſeaſe like, but inverſe to the *Diabetes* (to wit, in which the Blood being diſſolved into ſeroſities, did pour forth its liquids thorow the whole Body) did ever happen, without doubt it was ſometime the epidemical Fevour called the Engliſh Sweat, where the Blood melting into aquoſities did pour forth all the humours both profitable and unprofitable, even to the expence of the vital food, into the pores of the Body to be ſent away by Sweat.

The evident cauſes of the Diabetes.

So much concerning the formal Reaſon and cauſes, to wit, the conjunct and more remote, of the Diſeaſe of the *Diabetes*, as to the evident, cauſes to wit, the occaſions by which the acid juices, which excite the fuſion to coagulation of the Blood, are begot in our Body, theſe are of a various kind and original. An ill manner of living, and chiefly an aſſiduous and immoderate drinking of Cider, Beer,

Beer, or ſharp Wines; ſometimes ſadneſs, long grief, alſo convulſive affections, and other inordinations and depreſſions of the animal ſpirits are wont to beget and cheriſh this morbid Diſpoſition. I knew one uſing Rheniſh Wine for his ordinary drink twenty days together, that contracted an incurable *Diabetes*, of of which he dyed within a month, notwithſtanding all the remedies and councels of a great many famous Phyſitians. I remember two Women obnoxious to convulſive and hypochondriack Affections, to whom accrued from thence a great flood of Urine with languor, and waſting away of the Fleſh. Part I.

The Theory of this Diſeaſe being now explicated, there remains yet for us to ſhew the reaſons of the known ſymptoms, I ſuppoſe ſome of them to be manifeſt enough out of the premiſes, to wit, wherefore there is ſo ſwift and copious an excretion of urine in the *Diabetes*: But that the ſick are fevouriſh, and very thirſty, the reaſon is partly, becauſe the humours and the juices by which both the Blood and the ſolid parts are moyſtned and refreſhed, are by a too continual expenſe drawn forth by the *Diureſis*, or urinary evacuation, wherefore the throat is dry, and the *Præcordia* are greatly heated: and partly becauſe the Heart by the urgent inſtinct of Nature, and the Lungs are provoked into a more rapid motion, that the Blood being deprived of the moyſtning *Serum*, might be hindred from coagulation or concretion or growing together, and might be continued in its due Circulation.

The explication of notable Symptoms in the Diabetes.

From whence the often and copious piſſing.

From whence the Fevour with thirſt and languiſhing.

But it ſeems more hard to unfold, wherefore the Urine of the ſick is ſo wonderfully ſweet, or hath an honied taſte; when rather on the contrary if according to our *Hypotheſis* the fuſion of the Blood and (which therefore follows) the profuſion of the Urine happens by reaſon of the combinations of Salts, the Liquor certainly impregnated with theſe ſhould be rather ſalt then ſweet. But it is eaſy to unfold this in declaring firſt of all that the urine is deprived of its ſalt taſte, for as much as many Salts that are of divers Nature are combined in it. For this appears by a manifold experiment in Chymiſtry, that if Salts that are of a divers Nature, as fixed and volatile, be mixed with an acid thing, the acrimony of either is diminiſhed or loſt; wherefore we need not wonder that the urine of thoſe labouring with the *Diabetes* is not ſalt. But why that it is wonderfully ſweet like Sugar or hony, this difficulty is worthy of explanation.

Wherefore the urine of the ſick is ſweet like hony.

Some would think this effect to ariſe from this, that together with the Blood running forth thorow the Reins, both the recent nutritious Liquor, and the meltings of the ſolid parts are ſent away, wherefore it ſhould ſeem not improbable that this ſweetneſs ſhould be procured from theſe fat juices being mixed with Stale. But indeed from that mixture only a ſoft taſte like milk or broth of fleſh, pleaſingly ſoft, but not ſweet like hony ſhould ariſe, yea but to this which is not only grateful but in a manner pricking, Saline ſpiculas or little ſtingings together with ſulphureous ſweetnings (as I have elſe where ſhewed) ought to concur. Wherefore as we have ſhewed Sugar and Hony to be made ſweet deſervedly by the concretions of ſaline Sulphurs, ſo it may be ſuſpected of the Urine in the *Diabetes*, that with the ſalts combined in the *Serum* ſulphureous Particles picked forth of the Colliquation of the ſolid parts, do grow together.

The honied taſte is not from the nutritious juice, but from the combinations of Salts with Sulphur.

As to the fore-knowledge, this Diſeaſe at firſt is often eaſily cured, but being confirmed moſt rarely or with difficulty. For as much as the diſpoſition of the Blood being but a little laxed, is reduced without great trouble, but that being very much looſed ſo that very many parts ſeparate the one from the other, it ſcarce or never can be reſtored.

Prognoſticks of the Diſeaſe.

As to what belongs to the Cure, it ſeems a moſt hard thing in this Diſeaſe to draw true propoſitions of curing, for that its cauſe lies ſo deeply hid, and hath its origine ſo deep and remote. For, what is commonly thought, that the Reins, and the other ſolid parts, containing or tranſmitting the *Serum* and the Blood are in the fault, becauſe that they ſend away too haſtily their contents, and for that cauſe aſtringing Medicines are chiefly and altogether to be inſiſted on: I ſay both reaſon and experience doth contradict both this *Hypotheſis* and practice, for that few or none are cured by this Method: and it is highly improbable (if I may not ſay impoſſible) for that *Diureſis* to proceed from ſuch a cauſe.

Three Indications of the curing Part.

Therefore in this Diſeaſe as in moſt others there are three chief therapeutick Indications. *viz.* Curatory, Preſervatory, and Vital. The firſt of thoſe reſpecting the Diſeaſe, and endeavouring to reſtrain the exceſſive *Diureſis* or urina-

Part I.

ry evacuation, cannot be done without the Second, which aiming at the cauſe of the Diſeaſe endeavors to preſerve, and to reſtore, the mixture of the Blood or its due Complexion. Wherefore the chief Intentions of healing as to the medicinal Cure of this Diſeaſe are to take care there be no fuſion of the Blood, and if any be made to take it away. In the Firſt place the fuſion of the Blood is inhibited whilſt that its more craſs parts, and watry do continue themſelves, and are contained together, neither the one go away from the other ſo continually and very haſtily; which indeed is effected by thickning Remedies commonly ſo called; whoſe viſcous and very glutinous bodies being admitted into the bloody Maſs do pertinaciouſly ſtick cloſe to its active Particles, and ſo ſeparate them one from another, and hinder them, leſt they ſhould be mutually combined among themſelves by an ariſen flood or with ſuffuſed ſaline Particles from another place. For this end Rice, white Starch, alſo Gums, and ſome Reſins are wont to be helpful in this Diſeaſe. In the ſecond place, that the fuſion of the Blood being already made, may be taken away, thoſe ſorts of Remedies have been made known which diſſolve the concretions of the Salts, ſo that all the implanted elementary Particles, being at laſt made of their own kind, may recover their former State, and ſo make whole again the ancient complexion or *Craſis* of the Blood. Of this ſort are ſuch as have an effect on coagulated Milk, fixed, volatile, and nitrous Salts, alſo ſpirits of Harts horn, of *Sal* Armoniack and ſuch like, as we have ſhew'd before. The reaſon of which is (as we have in the ſame place intimated) that whilſt the ſaline, fixed, volatile or nitrous Particles, being in a ſufficient quantity put into the Milk, do meet with the acid or precipitatory Particles, and are combined with them, the remaining ſaline Particles which are bound, being now freed and diffuſed thorow the Maſs of the Liquor do diſſociate the ſulphureous terreſtrial combined among themſelves, and diſperſe them on every ſide, becauſe that all the Particles being equally mixed again, they might mutually contain themſelves, and be contained. So alſo by theſe the anology of the Blood is altered by reaſon of the ſaline Stagmas powred thereto being warm, we have there ſhewn by received experiments. But yet for curing the *Diabetes*, becauſe that ſaline Medicaments are for the moſt part eſteemed to be always Diuretick, we muſt not eaſily or raſhly give them, although in the mean time, as neither reaſon ſo neither experience is contrary to this Method. For I have often preſcribed in this Diſeaſe the tincture of Antimony with good ſucceſs, alſo a water of a ſolution of quick Lime with ſhavings of Saſſaphras, Anis ſeeds, Raiſins and Liquoriſh, according to the vulgar Receipt, is very much commended by ſome.

The chief Intentions of healing.

To hinder the fuſion of the Blood.

2. To take it away being made.

Which is probable to be effected by Salines of a divers Nature.

An Hiſtory.

A certain noble Earl, noble both by the ſplendor of his Birth, and for thoſe known excellencies of his mind, of a ſanguineous temper, of a freſh Countenance, and in the ſtrength of his Age, it being uncertain by what cauſes became too prone to a *Diureſis*; and ſo as for many months, he was wont to ſuffer oftentimes a *Profluvium* or flux of Urine, at length (as it ſeems) he fell into a confirmed, and deplorable *Diabetes*. For beſides that in the ſpace of a day and a night, he voyded almoſt a gallon and half of limpid Urine, wonderfully ſweet, and as it were honied, he was alſo affected with an huge thirſt, and a Fevour as it were hectick, with great languor of the Spirits, the failing of Strength, and Conſumption of the whole Body. When at this time I was ſent for to conſult with the famous Phyſitians Doctor *Micklethwait* and Doctor *Witherly*, theſe following remedies (by the uſe of which he was ſeen ſhortly to grow well) were preſcribed.

Example of the Cure.

Take the tops of the Cypreſs tree Mviij, of the whites of Egs beaten ij, of Cinamon ʒß, being cut ſmall pour them into new Milk ℔viij, diſtill it with ordinary Stills, taking care it taſte not of the fire: Let him take ʒvj, thrice in a day.

Take Gum Arabick and Gum Tragacanth of each ʒvj, of penid. Sugar ʒj, make a powder. Let him take about ʒj or ʒjß, twice in a day with the diſtilled Water ʒiij or ʒiiij.

Take of powder of Rhubarb 15 *gr:* of Cinamon vj *gr*: make a powder to be taken n the morning repeating it in ſix or ſeven days.

Take of Couſlip water ʒiij, of Cinamon Barly water ʒij, Syrup of *Diacodium* ʒß, make a draught to be taken every evening.

His Diet was only of Milk which he took now crude, and diluted with diſtilled water or elſe with Barly water, ſometimes boiled with white Bread, or with Barly oftentimes in a day. When by the uſe of theſe he grew better every day,

within

within a months time he ſeemed to be quite well: When he began to be indifferent well, the inſipid Urine was not much more than the quantity of the liquids that he took, and then it was ſomething ſaltiſh, and leſs than what he drank: Then after a little while growing ſtrong, with his wonted order of Spirits, he returned to his former Diet. Part I.

But yet the diſpoſition to this Diſeaſe did not ſo thorowly ceaſe, but that afterwards being apt to relapſe by frequent fits, by reaſon of any diſorders of living, and perhaps by reaſon of changes about the times of the year; he at firſt made his Water more plentifully, and then limpid and ſweet, with a feveriſh thirſt and languiſhing of Spirits: But by the uſe of the ſame Medicines it was wont to go away again in a ſhort time. Not long ſince after a long interval of health, a little before he began to fall into a flux of Urine, he ſuffered great enormities and defects in the nervous Stock; *viz.* a numneſs or torpor and vertigo in the Brain, ſudden Convulſions in the Members, little leaping of the tendons, and felt various runnings about as it were of a wind creeping here and there: Then when by the uſe of fit remedies, the aforeſaid ſymptoms ſeemed to be cured; the *Diabetes* after its wonted manner (the matter flowing forth of the Fibers and ſolid parts into the Blood, and from thence to the Reins and urinary paſſages) returned afreſh. *A Relapſe of the ſame diſeaſe.*

At this time the aforeſaid Phyſicians being called to Council, they adviſed the ſame method, and almoſt the ſame Remedies as had been formerly uſed, by the uſe of which when within a few days he began to find himſelf better; it was thought good to be preſcribed for him, water of quick Lime to be taken thrice a day about ℥v or ℥vj: By which Remedy having uſed it four days, he made his water in a moderate quantity, well tinged and coloured and ſomewhat ſalt, and as to the reſt, he ſeemed almoſt whole, as he had been in times paſt.

Chap. IV.

The Kinds and Forms of Iſchuretical Medicines, or ſuch as help to ſtop the Urine in Exceſs.

AStringent Medicines properly called, to wit, Auſtere, Bitter and Styptick, which by corrugating the Fibres of the *Viſcera*, and by contracting them into a ſhorter ſpace, do ſtop their expulſive and excretory Force, and for that cauſe do hinder an exceſſive *Catharſis* upwards and downwards, although they are wont vulgarly to be preſcribed, do effect little or nothing to the reſtraining the *Diureſis*, becauſe the vertue of theſe hath no power upon the bloody Maſs, and doth not reach to the Reins and Bladder. Wherefore in the *Diabetes* it is in vain, that the Barks and Flowers of Granates, Medlers, Tormentil Roots, and the like are preſcribed; as Reaſon tells us, ſo Experience confirms this to us. But the Remedies which are taken to help chiefly in the *Diabetes*, and do exactly quadrate with our *Hypotheſis*, as we have before hinted, are of a double kind, *viz.* the firſt which do hinder the combinations of the Salts, and conſequently the fuſion of the Blood, of which ſort are thoſe which are ſaid to be thickners, and have viſcous and glutinous Particles, which being admitted into the maſs of Blood, do pertinaciouſly adhere to its active Particles and diſſociate them, and do hinder that they may not be combined mutually among themſelves, nor with ſaline Particles poured forth from another place. Secondly, which diſſolve the accretions of the Salts, that they may reſtore the mixtion of the Blood, of which ſort are the Salts of another nature, that are apt to cohere to the acid Salt, and to draw away

Aſtringents do not help in the Diabetes.

Three chief Intentions of Curing.

Part I.

away that from the combinations ſo begun in the Blood, as chiefly thoſe Medicines endued with a fixed, as alſo with a volatile and alchaliſate Salt. Beſides theſe two chief kinds of Iſchureticks, there remains another ſecondary, *viz.* Hypnotick, or cauſing reſt; which by putting a ſtop or ſtay to the animal œconomy, makes the vital *Regimen* or Governance to be much more quietly performed, and for that reaſon with a leſſer fuſion of the Blood, or precipitation of the ſerous and nutritious humour. It reſts now that we add ſome ſelect Forms of every kind of theſe Medicines.

1. The thickning of the Blood.

1. The firſt ſcope of curing by which we endeavour by thickning the Blood, to take away its fuſion or to hinder it, is performed by theſe following.

Powders.

Take of Gum Arabick, Tragacanth powdered, of each ʒj, of Sugar'd Pellets ʒß, make a Powder and divide it into ſixteen parts: Take one part thrice a day, diſſolving it in diſtilled water, or in a decoction of the Roots of Comphry, in Spring Water, or Milk.

Electuary.

Take of reſumtive Electuary ʒiij, of the ſpecies of Diatragacanth frigid ʒj, of Red Coral broken ʒij, Confection *de Hyacint.* ʒjß, gelly of Vipers Fleſh what will ſuffice: Make an Electuary, of which take three times a day the quantity of a Walnut.

Take of white Amber, Maſtick, and *Olibanum* powdered, of each ʒj, the powder of *Haly* ʒij, of Balſom of *Tolu* ʒß: Make a ſubtle Powder, the Doſe ʒß three or four times in a day.

Decoction.

Take of the Roots of the greater Comfry, of water Lillies, of each ʒiij, of ſliced Dates ʒij, of the ſeeds of Mallows, of ſilk Worms, Plantane, and Flea-wort, of each ʒß, boyl them in Spring Water ℔iiij, till half be conſumed: Add to the ſtraining of the Syrup of water Lillies ʒij: The Doſe is ʒiiij thrice a day.

Emulſion.

Take of the decoction of Barly with water Lilly Roots ℔jß, of ſweet Almonds bruiſed ʒjß, of the ſeeds of white Poppy, of Purſlain, of Lettice, of each ʒß: Make an Emulſion according to Art. The Doſe ʒiiij thrice a day.

A diſtilled water.

Take of the tops of Cypreſs Mvj, of the leaves of Clary Miiij, of the Flowers of blind Nettles, Comfry, and water Lillies, of each Miiij, of the Roots of water Lillies, and Comfry, of each ℔ß, of Mace ʒj: All of them being cut ſmall, put them into new Milk ℔viij, diſtil them with an ordinary Still. The Doſe ʒiiij thrice in a day, with the Powder or the Electucry above preſcribed.

2. The reduction or fixing of the Blood.

In the ſecond place, Although ſaline Medicines of every kind are accounted Diuretick, and every one of them in ſome Caſes, for as much as they fuſe the Blood, and make its ſeroſities to go away more copiouſly, they are in a meaſure Diuretick: Wherefore the uſe of them may be well ſuſpected in the *Diabetes*, yet for the reaſon above cited, to wit, that by meeting with the acid Salt (when it predominates in the Blood) they take away and hinder its fuſion and deliqueſcency. I do not at all doubt but they may be adminiſtred ſometimes with ſucceſs, for the curing of the Fluxes of the Urine; and as ſoon as an opportunity ſhall be given, I have reſolved to find out the truth of this, by cautiouſly trying it: And indeed it appears, that this may be ſafely enough experimented; becauſe I have heard for certain, that one labouring with the *Diabetes*, was cured by an infuſion of quick Lime. But for that the ſaline Medicines, (which take away the dominion of the acid Salt, and as we ſuppoſe, bind it, as it were, with Chains) are endued with either a fixed, or a volatile, or an Alchaliſate Salt, I will recite ſome forms of Iſchureticks, in which each of theſe are the *Baſis*.

1. Medicines endued with a fixed Salt.

In the firſt place therefore, when the fixed Salt by it ſelf, or joyned with Sulphur, is required for the ground.

Tinctures.

Take of the Tincture of the ſalt of Tartar, or of its *deliquium*, what will ſuffice, let it be given in a little draught of ſome decoction or diſtilled water, but now deſcribed, thrice in a day.

Take

Take of the Tincture of Antimony, let it be taken after the same manner thrice in a day, the use of this I have by frequent experience learned to be very profitable in this Disease. Part I.

Take of salt of Coral ℈j, let it be taken after the same manner.

Take of the infusion of quick Lime ℔j, the Dose ʒiiij or ʒiij thrice in a day, taking before a dose of the Electuary or Powder above prescribed. *Electuary.*

Take of Conserves of the Flowers of blind Nettles, and of the greater Comfry ʒiiij, of the reddest *Crocus* of Steel ʒß, of Coral calcined to a whiteness ʒij, Syrup of Comfry what will suffice to make an Electuary. The Dose ʒij thrice in a day.

Take of *lapis specularis* calcined ʒj, the dose ʒß to ʒj, twice or thrice in a day. Countrymen with this Medicine happily cure their Cattle that make a bloody water. *Powder.*

Take of Coral calcined white and powdered ʒiij, powder of Gum Arabick, Tragacanth, of each ʒj, make a Powder, divide it into ten parts: Take one three times a day in a convenient Vehicle, to wit, boyled or distilled water.

Take of *Crocus Martis* the reddest ʒvj, of Gum *lac* powdered ʒß, red Sanders ʒj. Make a Powder, divide it into twenty parts, of which take one three times a day.

Take of Harts Horn burnt and powdered ʒß, let it be boyled in water of the Smiths Forge ℔iiij till half be consumed, adding towards the end a Crust of Bread, of the Roots of the greater Comfry, of water Lillies dryed, of each ʒjß, to the straining add of Sugar, Lozenges perled ʒij, take of it ʒiiij thrice a day. *Decoction.*

2. Medicines endued with an Alchalisate Salt, of which sort are Corals, Pearls, Cuttle Bone, Harts Horn, Ivory, powders of Shells, and such like, as they are commonly used against Rheumatick Diseases, so also for the *Diabetes:* And indeed according to our *Hypothesis*, for as much as they receive the acid Salt abounding in the Blood, and for that reason preserve the bloody Mass from fusion, a benefit is oftentimes not vainly expected from them. *2. Remedies endued with Alchalisate Salt.*

Take of the reddest Coral made very thin, of Cutttle Bone, of each ʒß, of Harts Horn philosophically calcined ʒiij, of Pearls, of Ivory, of Crabs Eyes, of each ʒj, mingle them and make a Powder: The dose ʒß, thrice in a day in a fit Vehicle. *Powder.*

Take of the same Powder ʒiij, of the Species of Diatragacanth frigid ʒij, of Sugar-Candy ʒij, make a Powder with what will suffice of the solution of Gum Arabick, make a paste: Let it be made into Troches weighing ʒß, take iij or iiij thrice or oftner in a day. *Electuaey.*

Take of the same Powder ʒij, of Electuary resumptive ʒiiij, conserves of flowers of water Lillies ʒiij, of the same Syrup what will suffice: Make an Electuary, take thereof the quantity of a Chesnut thrice in a day, drinking after it a draught of the Apozem, or distilled Water above prescribed.

3. For the same Reason that Medicines endued with a fixed and alchalisate Salt, so also those with a volatile, seem convenient for the curing the *Diabetes*: For these as well as they receive the acid Salt (by which the Blood is fused and melted into serosity) and draw it off, so that its liquor might recover its due complexion. *3. Remedies endued with a volatile Salt.*

Take of Tincture *solar* with *sal* Armoniack, (as I was wont easily) prepared ʒj: The dose is twenty drops thrice in a day. Spirits of Blood, of Soot, of Harts Horn also may be tryed in this disease. *A Tincture.*

Take of Salt of Amber ʒj, of the reddest *Crocus Martis* ʒij, mingle them and divide it into twelve parts: The dose is one part three times in a day. *Powder.*

What belongs to the third kind of Remedies in the *Diabetes*, *viz.* Hypnotick, which by stopping the animal Spirits retard the course of the Blood, and so hinder something its effervescency and fusion: I am wont, *Hypnotick.*

to

Part I.

to preſcribe to ſome to take every Evening *Diacodium*, and if that does not do, liquid *Laudanum*, or quinced or tartariſated, and to give it ſucceſsfully now every night, now every other night.

Take of the decoction of Barly, with the dryed Roots of Comfry ʒß ʒvj, of the Seeds of white Poppy ʒij, of ſweet Almonds blanched number vj: Make an Emulſion according to Art, to be taken every Night going to Sleep.

Take of the magiſterial diſtilled Water above preſcribed ʒiij, of the ſolution of Tragacanth ʒij, of *Diacodium* ʒß to ʒvj, to be taken going to Sleep.

Take of the conſerve of water Lilly flowers ʒij, of tartariſated or quinced *Laudanum* ℈j, of the Tincture of Steel, drops vj: Make a *Bolus* to be taken going to Sleep.

SECT. V.

CHAP. I.

Of Sweating and Hydrotick Medicines, or Evacuating by Sweat.

THE Aliments for the nouriſhing of the Bodies of Animals, are taken in at one paſſage only, to wit, by the Mouth: But Nature provident enough, hath formed a manifold going forth or many ways of Evacuation, whereby the ſuperfluities of the nouriſhing matter, or all the incongruous Particles either taken from ſome other place, or begotten within, might be caſt forth adoors: Whatſoever of Food there is occaſion for, it ought to enter always in at the ſame door, for that it might be ſufficiently known and examined, for poyſons would eaſily creep in through more, or poſtern doors opening inwards together with the Aliments; that if any hoſtile matter for all the watch of this ſingle door ſhould enter in, or ſhould be begotten by the fault of an internal governance, this might be able to lye hid in no lurking place or corner, but that there might be in the ſame place doors opened for its excluſion: For if any Heterogeneous thing ſhould ſubſiſt in the firſt paſſages, it is purged forth by vomit or purging; if that going farther it ſhould mingle it ſelf with the Blood or nervous Juice, or ſtick cloſe to the ſolid parts, by and by it is caſt forth by tranſpiration and ſweat, or elſe by Urine. But if that Nature for that it is ſlothful, or hindred, cannot either quickly or ſufficiently ſend forth of its own accord, the extraneous matters by theſe paſſages, Medicine muſt ſupply with convenient Remedies, whereby every defect or fault about the manner and ways of Excretions may be helped. Therefore as we reaſoning of Vomiting, Purging, and Evacuation by Urine, have more largely ſhewed already, what ſort of Medicines deſtinated to thoſe ends do produce their operations on the affections both of the Humours, of the Spirits, and of the *Viſcera*; ſo now there remains in this place to be unfolded by what way and by what Medicines, a more plentiful *Diaphoreſis* (or evacuation by ſweat) or ſweating, if at any time needful, is wont to be provoked. That theſe may be the better known, it is behooful in the firſt place to declare what the matter of Sweat is, and its formal reaſon, and in what, and by how many ways plentiful ſweating very often happens without evacuation, by reaſon of external accidents, or by an inteſtine Orgaſm of humors or ſpirits.

One only way of Ingeſtion, many of Egeſtion lye open.

The reaſon of this is hinted.

How Medicine helps its defects by Evacuation, by Sweat, and likewiſe by other Excretions.

In the *Diaphoreſis* or evacuation by Sweat contrary to Purging, the motion of excretion tends from the firſt paſſages, and as it were from the moſt inward Center of the Body to the Circumference: In both theſe the Arteries do carry more to the places of Evacuation, than the Veins do carry back; at other times the Veins do render back from the places which are oppoſite to them, more than the Arteries do force away. In purging, a greater load is impoſed to be carried by the ſplanchnical Arteries, together with the Veins reſpecting the habit of the body: But it is quite contrary in evacuation by Sweat, becauſe in this whilſt the Arteries do convey more than ordinary towards the circuit of the Body, the Meſaraick Veins do carry away a greater proviſion from the *Viſcera* of concoction, than the Arteries do bring thither. In like manner in the other evacuation, whilſt the ſplanchnick Arteries do pour forth into the *Viſcera* more than is due, the extrinſick Veins carry back more from the habit of the Body, than the Arteries carry thither. Wherefore as either evacuation is procured by many ways, ſo alſo this way not the leaſt, *viz.* whilſt the Arteries reſpecting either the *Viſcera* or the habit of the Body are urged into more rapid motions, a greater load of humours is preſſed into the Veins,

How Evacuation by Sweat differs from Purging.

Part I.

which are of an oppoſite power. By what means Diaphoreticks do perform both theſe intentions ſhall be declared anon: In the mean time, we will take notice about the *Diaphoreſis* in its kind, that ſweating in reſpect of the ordinary perſpiration is eſteemed even as a *Diarrhœa* to the natural emptying of the Belly, to wit, that is only a quicker, and more intenſe tranſpiration. For as often as the Blood growing more hot than ordinary and as it were flaming forth, emits more copiouſly its hot *Effluvias*, theſe carrying with them many Particles of the *Serum*, make Sweat.

The matter of Sweat is either Elementary or Humoral.

The matter of ſweat may be called either elementary or humoral; as to the firſt, this in like manner as urine conſiſts of Spirit, Salt, and Sulphur moderate, of more copious *Serum* and a very little of Earth. That it is ſo, is eaſily gathered from the expence of the Spirits in ſweating, the watry ſubſtance, ſalt taſte, unctuoſity and feculency of this Excrement: For indeed whilſt the Blood for the prolonging the Life of living Creatures is continually enkindled in the Lungs, and from thence flaming forth is conveyed from the Heart by the Arteries into all parts, certain ſubtil, to wit, ſpirituous aud ſulphury Particles, being moſt fit to fly away, do copiouſly proceed from its enkindled and rarefied Liquor; which flowing forth thorow the Pores of the Body, ſnatch with them forth adoors very many little bodies of the *Serum*, and ſomewhat of the reſt alſo. If that theſe kind of *Effluvias* be few, they fly away leiſurely, and exhaling moderately, they vaniſh away almoſt undiſcernable, but if theſe *Effluvias* being more heaped up do break forth thickly, whilſt they can ſcarce pierce thorow the pores of the Skin, they are condenſed into water, even as in like manner vapours being ſent forth from boyling water, make wet the cover of the Pot that lies over them.

1. What the Particles of the former are.

2. Of what the latter conſiſts.

The ordinary humoral matter of the ſweat is ſcarce any thing elſe but the *Serum* of the Blood, to which ſometimes are joyned, if indeed that excretion be inordinate, portions of the nutritious and nervous Liquor, and other humours from the *Viſcera*, *Glandulas*, and lymphick Veſſels, being forced away, yea farciments or meltings of the ſolid Parts: But this, whatſoever it be, is chiefly caſt forth from the Arteries, although we cannot deny that ſomething beſides doth ſweat forth alſo from the Nerves; moreover ſomething of Humour is attenuated into vapour by the force of heat, from the Fibres and ſolid Parts, which growes again into dew about the Skin. But indeed it is the Blood it ſelf only, which by its heat makes every humour evaporate, and emits the cheifeſt part of what it ſweats forth from its own boſom.

Three things required to ſweating.

That ſweat may copiouſly and eaſily break forth, theſe three things are required, *viz.* That the blood growing more hot then ordinary be more rapidly circulated, Secondly, that its *latex* or water, with very many watry Particles, and thoſe ſoluted, that is, to be ſeparated from the remaining Liquor, and apt to be reſolved into vapour, may abundantly flow over. Thirdly and laſtly, that the Pores of the whole Body may be ſufficiently unlocked and lying open.

The firſt condition is that the blood may be more rapidly circulated.

1. The reaſon of the firſt condition ſeems manifeſt enough, for unleſs the blood being rapidly circulated, is carried in ſo great plenty through the Arteries, that the reſidue cannot be all received in its reduction by the venoſe Artery, by the lymphick Veſſels or inſenſibly exhaled by perſpiration, there would be nothing ſuperfluous, that might iſſue forth by ſweat: for this *Latex* or water is out of the ſuperfluous or rejected matter of thoſe Pipes. But the Blood for the ſtirring up the more plentiful ſweat is circulated more rapidly, for as much as it is driven about with a great force by reaſon of the more often and more vehement *Syſtoles* or Pulſes of the heart. Of the effect of which as there are many evident cauſes, they may all of them or at leaſt the chief of them be reduced to the two following kinds.

which depends partly on the blood, and partly on the animal Spirits.

The efficient cauſe both for actuating and alſo variouſly altering the motion of the Heart, are the animal Spirits flowing from the Cerebell or little Brain; but the final cauſe is the circulation of the Blood: for, as its primitive motion is inſtituted for its ſake, ſo accordingly as the blood ought to be circulated by reaſon of many occaſions, either quicker, or ſlower, vehemently, or leiſurely, or after other ways, for that end alſo the Beating or Pulſe of the heart is diverſly varied. How often ſoever therefore it is ſo intended that it might ſtir up ſweat, it comes to be ſo done either by the neceſſity or need of the Blood, or by the Inſtigation of the animal Spirits.

How this cauſe is from the bloods part.

Whenſoever the Blood growes more hot than it ought or is enkindled, leſt it ſhould be choaked within the boſom of the Heart, it ought to be turned about more ra-

rapidouſly. But of ſuch an efferveſcency or enkindling there are too many cauſes, and pretexts. For ſometimes the Blood being too much carried forth by its proper Sulphur, after the manner of Vines, ſwells up of its own accord. Further that, from hot things taken in at the mouth, by reaſon of an ambient or outward heat, a more quick motion of the Body, the ſhutting up of the Pores, and many occaſions being heated or agitated above meaſure, and more than uſually inkindled, requires to be ſo circumagitated or turned about, for that ſweating might follow. Part I.

2. Sometimes the Blood being quiet of it ſelf is moved into an hydrotick efferveſcency, by the Inſtigation of the animal Spirits. For indeed in acute griefs, violent paſſions, in great impediments of the natural and vital functions, in the Agony it ſelf of Death, and in other faintings or affections of the Spirits, when the health of the body is greatly in danger, the ſenſitive Soul, that it might conſerve the vital flame of the Blood from expiring, inſtigates the Heart into a moſt rapid motion, whereby, whilſt the Blood is driven about more impetuouſly, for the moſt part alſo ſweat is ſtirred up. *And how from the part of the animal Spirits.*

The ſecond thing requiſite for the ſtirring up of ſweat is, that whilſt the Blood growes exceeding hot, or is inflamed more than its wont, and emits plentiful *Effluvias*, its *Latex* or water in the ſerous humour which is apt to go away and to be exhaled from its remaining Maſs, abundantly overflowes; for otherwiſe a dry evaporation alone as from boyled oyl, alſo urged by a fevouriſh or any other intenſe heat breaks forth, and no ſweat. Thoſe whoſe blood is full of *Serum*, and have it ſomewhat ſoluted and lax, upon very light occaſions fall into ſweating. But if that the *Serum* be deficient, or be too much compacted by the Blood, or being very much thickned by reaſon of incocted feculencies, it is not eaſily ſeparated; and if the burning heat of a continual burning fevour doth trouble one, and that moſt ſtrong Diaphoreticks be adminiſtred, ſcarce any ſweat at all follows. 2. *Of the* Ephidroſis. *The ſecond Condition is that the joyntings of the blood be laxed and looſned.*

Thirdly, it is required for the right procuring of ſweating that whilſt the Blood grows hot, and is ſufficiently moiſtned by a watry and eaſily ſeparable humour, the Pores alſo of the skin ſhould be unlocked and lye open; for unleſs the Body be perſpirable, it will be in vain to endeavour a *Diaphoreſis* or ſweating. Some have ſo very thick skins and almoſt not to be pierced thorow, that if helpt too by winter cold, thou mayeſt oftentimes wring out water ſooner from a Pumice Stone than out of their hides. 3. *The third Condition of ſweating that the Pores be open enough.*

So much for the chief things neceſſary for the ſtirring up of the *Ephidroſis* or ſweating, which for that ſometimes they may be in ſome part defective, may be the cauſe that ſweat hardly or not at all ſucceeds, ſo ſometimes by reaſon of the exceſs of theſe, or ſome other irregularities about the humours or habit of the Body; too often and too plentiful ſweating is wont to infeſt ſome; ſo much that the nutritious Juice is no ſooner conveyed to the Blood, but the whole preſently, with the ſerous water ſweating out at the Pores of the skin, is ſpent in moiſture. If we ſhall inquire into the Reaſons of this, theſe three do chiefly occur, in ſome of which or in all together they ſeem to conſiſt. *The cauſes of too much ſweating are hinted.*

1. A too great propenſion therefore to ſweating ariſes, becauſe the Blood is vitiated in its *Craſis*, and being made weaker doth not aſſimilate the nutritious Juice which it receives from the Chyle; wherefore, as a Stomach of a broken and unſound tone, it is compelled to vomit forth the infuſed humour, as ſoon as it is filled with it. Hence it is that nocturnal ſweatings and very grievous do ſo very much follow in continual Fevours; for as much as in theſe the Maſs of the blood (like ſower milk, which being made hot over the fire, is fuſed of its own accord without the addition of any coagulating thing, and precipitated into ſeroſity) is of ſo looſe joynting, that it is upon every light occaſion looſned in the mixtion. To which it may happen that the blood being impoveriſhed is not fully inkindled; wherefore there is a neceſſity for it that the crude juices, that are but little waſted by efflagration, ſhould whilſt the blood is incited break forth more plentifully into ſweat. 1. *The firſt of which is Dyſcraſy or debility or a more ſparing inkindling of the Blood.*

Secondly, It is not improbable that the too great propenſion to ſweat does in ſome meaſure proceed from this cauſe, *viz.* that either the Reins or the Lymphæducts do not every where ſufficiently perform their offices. For if by chance the ſuperfluous ſeroſities of the arterious blood are not ſent away by this or that way, 2. *The Evacuation of the Serum by other wonted ways being prohibited.*

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way, there will be a neceſſity that they muſt be ſomewhere ſtored up, hinder the circulation of the blood, aud not ſeldom cauſe the Dropſy.

The third the openeſs of the Peres.

Thirdly, If at any time for the aforeſaid Reaſons the ſweating diſpoſition ſhall affect one, the ſame may be further increaſed, and more often and more copious ſweats may diſtill forth of the Pores of the skin, and paſſages ſhall be more open than ordinary; which kind of affection is ſometimes from nature, and ſometimes from ſome accident. I have known the Bodies of ſome to be ſo cribroſe or full of holes that they were not able to ſuffer the leaſt breath of air, who alſo by every more quick motion, or by the heat of the Sun, the fire, or of the Bed, would be forthwith diſſolved into moiſtnre.

The formal Reaſon and conjunct Cauſe of Sweat.

From theſe which are required to the full provoking of ἐφίδρωσιν or Sudation, and that too much cauſe it, thus laid down, it will be eaſie to gather, what both the formal Reaſon and conjunct Cauſe of ſweat may be; for either conſiſts in this, that the blood abounding in *Serum*, and lying ſomewhat looſned in its joynting, whilſt that by a more quick pulſe of the heart it is circulated more rapidouily, and ſo more carried thorow the Arteries, than can be preſently the bloody part returned back by the Veins, and the ſerous part ſent away by the Reins and Lymphæducts; therefore there will be a neceſſity that whatſoever of the *Serum* is ſuperfluous imbued alſo with other Particles, muſt ſweat out thorow the ſuffiently open pores of the skin.

Its more remote cauſes.

What belongs to the other cauſes, of ſweating, *viz.* Procatarctick and evident, they which are of the former kind reſpect either the Maſs of blood, ot the animal ſpirits. For theſe (as we have already hinted) being obnoxious to convulſive, and other irregular Affections, ſometimes either of their own accord or occaſionally fall into exploſive and inordinate motions; by which alſo the *Præcordia* being hugely agitated, they impetuouſly drive about the Blood, and cauſe it by that means to be looſned into ſweats. But truly the antecedent cauſe of ſpontaneous *Ephidroſis* or ſweating more often lies hid in the bloody Maſs: for if at any time heterogeneous Particles, and wholly incongruous, are heaped together to a fulneſs in its boſom, that, at length being burthened growes hot or works with an ariſen Flux, that, what is burthenſom together with the ſerous water might be ſeparated and caſt forth adoors by ſweat; which ſort of ſweat according to the eaſy, difficult, or impoſſible excretion of the offending matter is called either Critick (which is moreover more or leſs perfect) or Symptomatick. We have largely enough diſcourſed concerning theſe in our *Puretology*, ſo that there is no need to ſay any more of it here.

The evident cauſes of Sudation.

2. The evident cauſes of ſudation to wit, which very much provoke by themſelves a wonted *Ephidroſis* or Sudation without a *Procatarxis*, or medical Indication, as they are various, and divers, *viz.* things taken in at the mouth, or outwardly applyed, too great a commotion of the Mind, or Body with many others, it will be here convenient to note briefly the chief of them together with the diſtinct Reaſons of their affecting: By which rightly underſtood will be better known by what means and with what diverſity Medicines deſtinated to this buſineſs do move the *Diaphoreſis* with ſweat.

1. *Agitation of the Body.*

1. In the firſt place therefore, ſweat is wont to be provoked by a more quick motion of the Body, as may be well perceived in running, leaping, carrying of burthens, pulling or drawing and ſuch like. The reaſon of which is, becauſe the Muſcles of the Body being vehemently exerciſed, they preſs together the interpoſing Veſſels, and ſo thorowly agitate the Blood, and drive it too and fro ſtrongly; and as by this means the Veins are very much ſtrained, the Blood more eaſily ſlides forth, and creeps much more ſwiftly towards the heart thorow their Pipes being more and more opened; and ſo as it is more copiouſly laid up together within its right boſom, it oppreſſes it, or almoſt choaks it, and the Heart and Lungs, for the more rapid driving about of the blood do diligently labour by quicker and ſtronger endeavours: hence at length as that is more inkindled within the *Præcordia*, and by that means rarefied, and made looſe in its joynting, it exhales far more little bodies of heat, that is, of Spirit and Sulphur; which carrying forth adoors with them the ſeroſities (whilſt all the Veſſels do ſo ſwell up) unable to be reduced cauſe ſweat. And as of the Body, ſo alſo the immoderate exerciſes of the Mind move ſweats.

To which are alſo added the paſſion of the Mind.

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2, The ambient heat as that of the Sun, Fire, a Bath, Hot houſe, or ſuch like, is apt to provoke ſweat; becauſe hot *Effluvias* being ſent from without into our Bodies, and entring ſomewhat into the skin, unlock both its Pores, and paſſages, and alſo make hot the Blood, and compel it as water over a fire to boyl up; and ſo as being looſned from its joynting together, and rarefied, the ſudorifick vapours more copiouſly are exhaled. Neither doth the meer extrinſick Heat move ſweat only, but alſo that proper heat being detained about the compaſs of the Body from whence it did exhale. For there is nothing more uſual than that any one lying in Bed, whilſt he is covered with many bed-cloaths ſhould fall into ſweat. The reaſon of which is clear enough, for the breathings forth already departed, and being reſtrained about the ſuperficies of the body hath the nature of a dry Bath.

2. *Ambient heat.*

Sometimes the reſtraint of uſual tranſpiration cauſes Sweat; the reaſon of which is becauſe the Blood being prohibited from a more free breathing forth, as Muſt or new Wine being too ſtrait ſhut up in a Cask, more impetuouſly ferments; and thence being more rarefied and conſequently being agitated in a more rapid circuit, there is a neceſſity for it to be diſſolvid into ſweat. In times paſt it was a cuſtom among the Iriſh, if any one were ſick of a Fevour, to roll him up in woollen cloths wetted with cold water, by which means a plentiful ſweat ſucceeding the diſeaſe was often broken. The like experiment I have heard to be try'd with our Countrymen with good ſucceſs.

3. *The hindrance of wonted tranſpiration.*

4. Hot aliments being taken, eſpecially Salt, Pepper, and candied Spices, alſo drinks of ſtrong Waters, ſtrong Beer, and generous Wines, for as much as they imbue either the Blood with active Particles or with provokatives, as it were a certain ſting or fury, or that they miniſter to it being very hot and burning, ſulphureous and inflamable nouriſhments, as it were oyl to a Lamp, they ſtir up a more plentiful *Diapneon* of halituous or breathy matter, and for that cauſe greater ſweatings forth of the abounding *Serum*.

4. *Hot things taken inwardly.*

So much for the Nature of Sweat, and of both the conjunct and manifeſt cauſes. As to what belongs to its differences, it is wont to be diſtinguiſhed many ways, to wit, that it was ſpontaneous or forced, or partial or univerſal, or critick or ſymptomatick, the reaſons of all which are clearly enough made known by what hath been already ſaid. Moreover ſweat is either hot, of which we have diſcourſed hitherto, or cold in the Act, which ſort is frequently excited by a panick fear, a very acute grief, ſwooning, and in every ſudden failing of the Spirits, and the agony of Death. The cauſe of this ſeems to be, that from a huge and ſudden paſſion, the whole ſoul ſinking down contract its compaſs, and therefore the Spirits being ſcatter'd, and the Blood with the heat being drawn back towards the Heart, the outmoſt *Effluvias* paſſing forth thorow the skin being left by the following, and deſtitute of Heat, therefore they are condenſed into a cold Vapour, even as by the like Reaſon it is wont to happen in diſtilling. For if you ſuddenly repreſs or extinguiſh the fire, preſently the warm exhalation filling the Alembick is reſolved into a dew.

The differences of Sweat.

The cauſes of cold Sweat.

From theſe things thus premiſed and ſhown, which are chiefly requiſite to the provoking of Sweat, and by which occaſions chiefly, and ordinary accidents it is wont to be ſtirred up, it will not be difficult to ſhew with what powers and Particles Diaphoretick Medicines ought to be enricht, and by what means they produce their effects And firſt of all, as to what belong to their Properties or Virtues. Hydroticks or ſweating Medicines that are to be taken inwardly ought to be of that kind which may make the blood to be more hot than ordinary, and by conſequence to evaporate; alſo which may after a ſort unlock and fuſe its Maſs oftentimes too much compacted, and thickned, that from thence its ſeroſities may more eaſily be ſeparated and go away, and at the ſame time diſpoſe them ſo ſeparated, rather to be caſt forth by a *Diaphoreſis* or ſweating than by Urine or Siege. Theſe are the two primary requiſits or Indicancies to the *Ephidroſis*, by the right accompliſhing of which the Diaphoreticks of a various kind and energy are wont to be adminiſtred. As to what belongs to the three things requiſite (which we made mention of before) *viz.* the apertion of the Pores, this is effected for the moſt part only by external Applications, but yet by what means and after what manner it is wont to be done, ſhall be ſhewn hereafter. In the mean time that we may ſpeak of ſweating Medicines that are to be taken in at the mouth, it behoves us in the firſt place to ſhew by what general means thoſe do operate; then by what difference,

Of what ſort Diaphoretick Medicines ought to be.

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difference, and particular manner of affecting, and lastly with what virtue every kind, to wit, those wholly mixed or of one of the elements, *viz.* of Spirit, Sulphur, or Salt, being insigned, do exercise their Power both in the *Viscera* and in the Humours about the provoking of Sweat.

The general reason of their Energy.

1. As to the first concerning Diaphoretick Medicines in general, we note them to be such whose Particles are friendly enough to the Ventricle and Intestines, and do not provoke to any convulsion or excretory motion; moreover that they are in no wise to be overcome by them or to be assimilated like to Aliments; but that being taken into the Stomach they forthwith dispose both the animal Spirits, and also the Blood to yeild to an *Ephidrosis* or sweating. But indeed some of them being immersed in the Ventricle, and dissolved, by and by they stir up, and recreate the animal Spirits every where abounding in the nervous Fibres (of which the interior Coat is made) for the end that the *Hypostasis* of the whole sensitive Soul being presently erected, and stretched forth into a greater compass, they might make the *Præcordia* to be more lively actuated, and so the blood being rarefied and more inkindled, to be carried about more rapidously, and so to be driven into a *Diaphoresis* or sweating. Further, in the mean time the Particles of the same Medicine do pour themselves into the blood which waters the stomachal Vessels (which most thickly cover the nervous Coat) and whilst that they by and by ferment it, and make it to grow hot, they compel it to be forced thorow the veins more rapidly than it is wont towards the *Præcordia*; to which when it is more impetuously brought, presently the Pulse of the heart being increased the whole Mass of blood rarefied, and more inkindled, and by the Particles of the Medicine most intimately mixed with it, agitated, it is carried along more quick thorow the Arteries to all the exterior parts; where when all its water is not able to be carried back, or received by the Veins or other leading Pipes, there is a very great necessity for much of the ferous humour to be resolved into Sweat. But the Particles of the sweating Medicine, being admitted according to the aforesaid manner into the Blood, do not only ferment and agitate its Liquor, but oftentimes they so loosen, and unlock its mistion, that its *Serum* and other excrements may be more easily separated and sent away. But for as much as this may happen to be done by a divers means according both to the divers constitution of the blood, and the Nature or preparation of the Medicine; it will here be worth our while briefly to explicate the chief Indications about moving a *Diaphoresis* or sweating, and the various ways of prosecuting it, together with the Reasons of them. But it is further to be noted in the first place that Hydrotick or sweating Medicines as to their ways of working and operations, have a great affinity with most Cordials commonly so called, in so much that many things of either kind are of common use or reciprocal, and as they so differ chiefly as to their greater or lesser efficacy, as often as it is behoveful to pass from one kind to another, there is need almost only to augment or diminish the Dose, and chiefly to choose fit times for administring.

Sweating Medicines are neer a kin to most Cardiacks or Cordials.

The matters of sweating Medicines are either integral parts of the mixture.

Or Elementary.

As to what belongs therefore both to the various kind, and preparation of the matter out of which Hydrotick Medicines are taken; they are for the most part the whole parts or elementary of every mixture. To wit, they are either natural concretes in their whole substance, or simples, or extracts which are given, as when the Leaves, Roots, or Seeds of *Carduus*, *Contrayerva*, *Angelica*, or the like are taken in Powder, Decoction, Conserves, or Magistery: or Diaphoreticks that consist in Particles of this or that element, to wit, spirituous, sulphureous, or saline, or in simples, or any other very excellent things; as if that Salt, or Spirit, or Oyl, are drawn out of *Carduus* or any other vegetable body, mineral or animal, and are reduced either by themselves or with other prepared things into the form of a Medicine, we will briefly touch of all or at least the chief of these kinds.

1. What are of the former kinds.

1. Diaphoreticks, whose virtue consists in the integral Particles of the whole Concrete, are inequally mixed, although they seem to excell in one certain element (*viz.* saline) more then in the rest of the Elements, and to own its virtue chiefly to it: But that salt, upon which the sweating force depends, offers it self in a double condition: For in some concretes it is volatile, and sharp or bitter, and in others Alchalisate, and as it were fixed.

1. In the first rank are very many vegetables, esteemed by the Ancients for Antidotes,

tidotes, as the leaves of *Scordium*, *Carduus*, Scabious Poyſon-reſiſter, the flowers of *Caltha*, Camomil, the Roots of Butter-bur, Zodoary, Galingal, *&c.* Alſo the confections of Mithridate, Treacle, *Diaſcordium*, alſo decoctions of *Guaicum*, Box, and ſuch like. The Medicines of which being put into the Ventricle and diſſolved, they make a Tincture, whoſe Particles ſeeing that they are more hot and exotick, do awaken the animal Spirits, from whence the *præcordia* being more lively actuated, drive about the Blood more rapidly. But alſo they go in and ferment the blood, abounding in the ſtomachal Veſſels, and ſo whilſt they make it to be carried back quicker towards the heart, they are alſo a Cauſe, that it is vehemently and ſweatingly driven forward through the Arteries into the habit of the Body. *By what means they operate.*

2. The other ſpecies of Diaphoreticks, which whilſt they conſiſt of integral parts mixed, have a moſt excellent alchal Salt; are Stones, and bony and ſhelly parts of Animals and Vegetables, as *Bezoar*, Pearls, Eyes and Claws of Crabs, and ſuch like, whoſe Diaphoretick Virtue proceeds chiefly from the Alchal Salt; for as much as its Particles ſometimes meeting with an acid Salt, both in the *Viſcera* and alſo in the Blood, and growing hot or fermenting with it, by that means cauſe the ſanguinious Maſs to be fuſed, and its ſeroſities to be ſeparated, and reſolved into ſweat.

2. Hydrotick Medicines, which after the ſpagyrick *Analyſis* owe their vertue, either to theſe or to thoſe elementary Particles, being formed from various ſubjects, and with a diverſe manner of preparation, are chiefly either ſpirituous or ſaline, or either combined one with the other, or with ſome ſulphureous Particles. For ſuch as are merely, or for the greateſt part ſulphureous, are leſs fit for this intention, becauſe ſuch being very infeſtous to the *Viſcera*, oftentimes provoke a nauſeouſneſs, and not ſeldom vomiting: Moreover ſuch as are Oily by reaſon of abundance of Sulphur and Fat, are not ſo ready to inſinuate their Particles into the maſs of Blood. We will make a ſpecial ſearch by what means or by what affection of the Spirits or Blood, theſe other do move ſweat. *2. Hydroticks whoſe Particles are elementary, of what ſort, and how many they are.*

1. And in the firſt place to the ſpirituous ſubſtance we refer Hot Waters and Liquors endued with any vinous Spirit, of which ſort are abundance from the fruits of Vegetables, or from dry things maturated by fermentation, or reſolved by putrefaction, diſtilled by the chymical Art, as are the ſpirits of Wine, of Cyder, of Beer, of Juniper Berries, of Elder Berries, of black Cherries, with many others which are commonly called Spirits; and are taken either ſimple or limpid by themſelves, or impregnated by the infuſion of other ſimples, are diſtilled again or given under the form of a Tincture. Theſe kind of winy Liquors being taken inwardly, for as much as they both ſet up the animal Spirits and provoke them into a greater expanſion, (whereby in like manner the motion of the Heart is increaſed) and for as much as they agitate the Blood, and (as by the acceſs of Oyl to flame) cauſe it to be more inkindled; they move ſweat. For the ſame reaſon and means of affecting, whereby theſe are wont to be called Diaphoreticks, they may be alſo Cardiacks or Cordials, if they be given in a leſſer doſe. *1. Spirituous.*

To the provoking of Sweat, prepared Salines of a various kind and diverſe condition, uſe to be preſcribed, and indeed with good ſucceſs; which notwithſtanding do not exagitate the blood, as Particles of the whole mixture, or merely ſpirituous, either by reaſon of their heterogeneity, or inkindle an inflammability, but only by forcing into its ſaline Particles, which whilſt they ſnatch them into their embraces, they pull them away from their too ſtrict combination with others, ſo that the joynting together of the Blood being laxed, and the Pulſe increaſed, the ſuperfluous ſeroſities and other excrements, may be more eaſily ſeparated and ſent away by ſweat. To this Cenſe or Rank (as in like manner we have ſhewed above to be in Diureticks, and as alſo will afterwards appear in Cardiacks) Salts almoſt of every condition ought to be referred, eſpecially volatile, fluid, fixed, and nitrous Salt, out of which ſingle or compounded among themſelves Diaphoreticks of the chiefeſt note are gathered, which being inwardly taken and meeting with other Salts both in the *Viſcera*, and alſo thoſe abounding in the maſs of Blood, and drawing them away from the embraces of other Particles, unlock the Blood and rarefie it, and ſo diſpoſe it to a *Diaphoreſis*. The chief kinds of theſe, and their manner of working, we will unfold anon; in the mean time notwithſtanding, as theſe ſaline Medicines which are wont to move to ſweats, are alſo given to move Urine, and ſometimes alſo for Cordials, it behoves us to ſhew by what preparation, *2. Salines. By what means they operate. In how manifold a Condition their ſaline Particles are.*

Part I.

preparation, and beſides with what requiſites, whilſt we give the ſame Medicines, we may be able to proſecute the *Diaphoreſis* apart from thoſe other Intentions.

With what preparation and manner of adminiſtration Diaphoreticks are to be given.

And indeed we take notice that ſudorificks inwardly taken, ſeldom or never operate of their own accord, as Emeticks, Catharticks, or Diureticks, but rather there is always need of a Rule to actuate the Medicine, and to determinate it to that energie: Wherefore a Diaphoretick being given, preſently the Patient is to be handled after that manner, that both the Pores of the Body may be opened, and that the Pulſe of the Heart may be much inforced. For theſe ends he is to be kept either in Bed, or a Bath, or in the heat of a hot-houſe, or elſe exerciſed with a more quick or hard motion of the Body, which that they may the better ſucceed in ſtirring up of Sweat, both the moſt fit time and ſubject, as often as it is in our power, is to be choſen; to wit, when the Blood has obtained a laudable *Criſis* or not very malignant, then when it abounds with much ſerous humour, and when as to its Particles it is not too much confuſed or diſturbed, but is apt to be eaſily unlocked, and to be ſeparated and fuſed into parts: For in a bilous Temperament in a lean and dry conſtitution, in the midſt of a burning Ague fit, when all things are diſturbed and indigeſted; oftentimes Diaphoreticks prove in vain or to ill purpoſe. Moreover, as often as they may ſeem to be of uſe, it is not convenient to give any of them indifferently, but the condition of the Salts, and alſo appropriated Medicines are to be choſen, according to the various condition of the Blood, and the diverſe manner of powers in it, now of this Element now of that. Concerning theſe with what choice, and in what kind of Forms they ought to be preſcribed, we will ſpeak in the following Section.

Both a fit ſubject and time to ſweat is to be choſen.

Chap. II.

The Kinds and Forms of Diaphoreticks, alſo the Reaſons of ſome of their Chymical Preparations.

The diſpoſing of Diaphoretical Medicines.

And Forms.

Sudorifick Medicines, for as much as they are manifold and divers, and to be ordained in a various reſpect, are wont to be reduced into Claſſes; therefore I think good firſt of all to diſtinguiſh and recenſe them here, both as to the Form or manner of Conſtitution, and as to the Matter out of which they are made. Their moſt uſual forms are 1. Powders, 2. Chymical Liquors, 3. Potions, 4. *Bolus*, 5. Diet Drinks. The matter of every one of theſe are either the integral parts of the whole mixture, or they are ſome elementary parts of ſome mixture reſolved or looſened by Chymiſtry, and they are either more ſimple, *viz.* either ſpirituous or ſaline, which latter again are either volatile or fixed, or alſo acetous or nitrous; or laſtly the ſudorifick Particles ſo divided and ſeparated by the Art of Chymiſtry, are Elementaries compounded among themſelves, *viz.* ſpirituous Salines, or ſaline Sulphurs. Whilſt we run through all theſe kinds in order, we will make ready for you the more ſelect forms of preſcriptions of every kind of matter.

1. *which have for their* baſis *the integral parts of the mixture.*

1. Diaphoreticks whoſe Baſes are the integral parts of the mixture, in which likewiſe a ſharp or volatile Salt is moſt potent, oftentimes help to the provoking of Sweat for this reaſon, for as much as their Particles being admitted into the Blood, as they are immiſcible and alſo indomitable or not to be overcome, they very much agitate and divide its Maſs, and as it were draw it into ſmall pieces, ſo that at length as the joynting together of the Blood being much laxed, and put into an effervеſcency or fermenting, together with the Particles of the Medicine,

to

to be caſt forth by reaſon of their heterogeneity, the ſuperfluous ſeroſities, and the recrements and Corruptions of the Blood are caſt forth adoors, what are of this Rank are wont to be exhibited in the form of Pouder, *Bolus*, Potion and Diet-Drink, according to the following Forms of Preſcriptions.

Part I. *Their Forms.*

1. *Pouders.* Take of the Powder of the Roots of *Contrayerva*, of Virginian Dragon Wort, of Butter-burr, of each ʒj, of Coccinel, of Saffron, of each ʒß, make a Pouder, the Doſe is ʒß, with ſome fit Vehicle.

Take of the Pouder of Vipers ʒj, let it be given in a convenient Liquor.

Take of the Pouder of Toads prepared from ʒß to ʒj.

When Diaphoreticks ought to excel in a ſingular Alchal Salt, or mixed with the former.

Take Oriental *Bezoar* ℈ß to ʒß, let it be given in a ſpoonful of diſtilled Water or other Vehicle.

Take of Pouder of Claws Compounded ℈j to ʒß, let it be given after the ſame manner. The Bezoartick Pouder is made after this manner.

Take of the Powder of the Roots of *Contrayerva*, of Crabs Claws ſimple of each ʒij, of Pearls, of both Corals, of the whiteſt Amber, of Crabs Eyes, of Harts Horn, of Cryſtal prepared of each ʒj, of the weſtern Bezoar, of Lemnian Earth of each ʒß, of the Ceruſs of Antimony ʒij, of Coccinel ʒß, Ambergrieſe ʒiß, muſk ʒß, make a ſubtil Pouder, which may be formed into little round Pills with the gelly of the Skins of Vipers. The Doſe ℈j to ʒj.

Take of the Pouder of this Bezoart ℈j, of Toads prepared vj *gr.* make a Pouder, let it be given in a ſpoonful of Treacle Water.

2. *Boluſes.* Boles whoſe *Baſis* is the integral parts of the mixture are reduced into the form of a Confection, Extract, and Conſerve.

Take of Mithridate ʒß to ʒj, of the Bezoartick Pouder ℈j to ʒß, of the Syrup of the Juice of Citrons what will ſuffice, make a *Bolus*; in the place of Mithridate may be put Treacle or *Diaſcordium* or Confection *Liberans* of *Hyacynt*: alſo *Bezoar* poudered or the Pouder of the Roots of *Contrayerva* or, others ſuch like may ſupply the place of the Bezoartick Pouder.

Take of the Extract of Treacle ʒß to ʒj, of Bezoartick Pouder ℈j, make a *Bolus*.

Take Extract of *Carduus* ʒß, of Bezoartick Pouder ℈j, Salt of Wormwood *gr.* xv, with what will ſuffice of the Syrup of the Juice of Citrons make a *Bolus*.

3. *Potions.* Ptoions whoſe *Baſes* are the common Decoctions or Infuſions and Tinctures of Vegetables.

Decoctions. Take of the Roots of Butter-bur ʒj, of the ſeeds of the ſame ʒij, the roots of condite *Eringo* ʒvj, of *Carduus* Seeds ʒij, let them be boyled in Spring Water ℔j to ℔ß diſſolve in the Colature of Mithridate ʒß or ℈ij, let it be taken warm in Bed.

After the like manner may be boyled the Leaves of *Carduus*, the Flowers of *Caltha* or of Cammomile in as much poſſet Liquor as will ſuffice, of which give ʒvj or viij hot, by it ſelf or with ſome Pouder, Confection or other Diaphoretick being added.

Infuſions and Tinctures. 4. Various kinds of Diaphoretick Infuſions, and Tinctures may be prepared by Extracting the Virtues of ſimple Vegetables and of Confections with wine Vinegar or diſtilled Water, which being afterwards ſtrained, and clarified by ſetling, are given by themſelves or added to other Liquors oftentimes with ſucceſs. Hither ought to be referred Waters, Wines and Bezoartick Vinegars prepared by Infuſion, the forms of which are every where to be found among Authors. Moreover the Tincture of Vegetables very Efficacious in a little doſe are made after this manner.

Chymical Tinctures. Take of the Roots of *Contrayerva* ℔j, bruiſed and put into a Matrace, pour to them of the Spirit of Wine ℔iij, let them digeſt till the Tincture be drawn forth, which ſtrain, and let it be abſtracted in *Balneo* to the Conſiſtency of Hony. The firſt Spirit abſtracted keep by it ſelf from the reſt, pour more to the reſidence, and laſtly extract the Tincture whoſe Doſe is in a fit Vehicle from ʒß to ʒj.

5. *Diet-drinks.* Diet Drinks whoſe *Baſes* are the Decoctions of Liquors, deſigned for the cure of the Venereal Diſeaſe and of other Chronical Affections deeply rooted in the Blood and Humours.

Part I.

For indeed a very intenſe and frequent ſudation, *viz.* for a long time, is ordinarily required for the cure of ſome Diſeaſes; *to wit*, that not only the impurities, and corruptions of the *Viſcera* and the Humours may be purged forth, but that the morbifick Tinctures deeply impreſſed in them might be wholly blotted out, and as it were extracted. For this end it will not be enough to give now and then a ſudorifick *Bolus*, but a whole Diet ought to be orderd for this purpoſe: wherefore let all the Drink be a Diaphoretick Decoction, after which Doſe taken alſo in the morning, let a plentiful ſweat be provoked further by the heat of a Bath or Stove. Then when as by this reaſon both the Pores of the Skin are unlocked, and that Nature alſo is inclined to ſweating, the whole day beſides by the uſe of the ſame Drink, the recrements of the Blood and nervous Juice ſhould evaporate by a continual breathing forth. By this method not only the Pox is moſt ſafely and for the moſt part certainly cured, but alſo other Herculean or difficult Diſeaſes are indeed happily healed.

Take of the ſhavings of *Lignum Sanctum* ʒiiij, of Sarſaparilla ʒvj, of China ʒij, of all the Sanders of each ʒj, of ſhavings of Ivory and of Harts Horn of each ʒß, of Antimony poudered and tyed up in a ragg ʒvj, let them be infuſed according to Art, and boyled in Spring Water ℔xvj till half be conſumed: then ſtrain it. To the remaining ingredients pour a like quantity of Water, make an infuſion, and a decoction to the conſummation of the third part, adding to it of Raiſins of the Sun ℔j, of Liquoriſh ʒj, ſtrain it, and let it be reſerved for the ordinarie Drink.

In a bilous Temperament, and a more ſharp and hot Blood, let the *Guaicum* be omitted, increaſing the Quantity of China and Sarſa.

Diaphoreticks eaſie to be got ready.

Diaphoreticks which conſiſt of the Integral parts of the whole mixture eaſily got for poor People are to be preſcribed according to the following forms.

In malignant Feavours take of conſerves of *Lujula* ʒj of Mithridate ʒiiß, mingle them, let it be taken drinking a draught of Poſſet Drink after it, with the Leaves of *Carduus* or of *Scordium*, or Cammomil, or Marigold Flowers boyled in it.

Take of the Pouder of the Roots of the Virginian Serpentary ʒß to ʒj, let it be given in a fit Vehicle, or take of the Pouder of the Roots of Butter-bur ʒ after the ſame manner.

In ordinary Caſes let there be given of the decoction of Grummel or *Milium Solis* or of Butter-bur Roots or of Virginian Serpentary, or of the Roots and Seeds of the great Bur. In the Venereal Diſeaſe a decoction of Saponary or Sopewort or the ſhavings of Box and the like, which may ſerve inſtead of the Decoction of Woods of greater Price.

2. Forms of Chymical Diaphoreticks.

2. Sudorifick Medicines prepared out of the Elementary parts of the mixture have for their *Baſis* either a Spirit, or a Salt ſometimes ſimple, ſometimes combined with another Salt or with Sulphur. The ſpirituous are preſcribed according to theſe following Forms.

1. Which have for their ground ſpiritual Particles.

1 The Spirit of Treacle Camphorated ʒß to ʒj or ʒiß, let it be given in a convenient Liquor. After the ſame manner many other Spirits ſtilled out of the Juices of Vegetables maturated by Fermentation and appropiated to certain Diſeaſes may be given to provoke Sweat when it is required. Of which ſort are the Spirits of black Cherries, of Elder Berries and of Juniper Berries with many others. The Spirits of Harts Horn, of Soot, of Blood and the like ought rather to be ranked in the Claſs of Salts.

2. Which have ſpiritual Particles combined with others.

2. Diaphoreticks, whoſe *Baſes* are Spirits with other combined Elementarie Particles, are preſcribed after this manner. Take of the ſimple mixture ʒj, let it be given in a convenient Vehicle. Hither are referred alſo what are of a Spirit with a fixed a Salt or Sulphur combined together. Of which ſort are the Tinctures of the Salt of Tartar and of Antimony, the Doſe of which is ϑj to ϑij in ſome other Liquor. Moreover Diſtilled Waters, in which the ſpirituous Particles are allayed or mixed with the Waters are wont oftentimes to be given to move Sweat with good ſucceſs.

Diſtilled waters.

Take of the Roots of Butter-bur, of Valerian of each ʒij, of Zedoary, *Contrayerva* Virgin. Serpentary of each ʒiß, of the Flowers of Butter-bur Miiij, of Saffron ʒij being all cut and bruſed pour to them of ſpaniſh Wine ℔iiij, diſtil it according to Art, and let the whole Liquor be mixed. The Doſe ʒiiß to ʒiij,

or

or take of the Roots of *Angelica*, of *Imperatoria*, of each ʒiiij, of Zedoary, of Enula Campane, of Poyſon-reſiſter, of Gentian, of the leſſer Galingal of each ʒj, of the tops of *Carduus*, of Rue, of Angelica of each Miij, of the middle Bark of an Aſh ʒvj being cut and bruiſed, add to it of Mithridate, of Treacle *Andromach.* each ʒij, mingle them and pour upon them of the beſt wine ℔vj, of diſtilled Vinegar ℔ij, diſtill them according to art, the doſe is ʒiij. Part I.

The doſe of the aforeſaid Waters may be actuated by the addition of Chymical Liquors or Salts. Theſe ſort of Liquors indued with a wine Spirit, are cheifly and almoſt only convenient for old People, alſo for ſuch as are indued with a more cold temperament, as for thoſe that are obnoxious to the Palſie or the Dropſie; but in a hot Conſtitution, and when there is a heat of the *Viſcera* or a feavouriſh Effervescencie of the Blood, for as much as they torrefie, and enkindle it too much, they are wont rather to hinder than to help.

Diaphoreticks whoſe *Baſis* is ſaline, as they are of a various Nature *viz.* (according as the volatile fixed Acetous or Nitrous Salt exiſts) ſo they are of a divers uſe, and operation, hence it is that in ſome caſes theſe are better, and in others thoſe, or they are adminiſtred, as we have noted before to be in Diureticks. *2. Whoſe Baſis is Saline.*

1. Fixed, and Volatile Salts are moſt convenient for thoſe whoſe Blood very much abounds in a Serous Humour. Moreover when at any time the Juice watering both the *Viſcera* and the Nervous ſtock turnes into a ſowerneſs, as it is wont to do in Dropſical and Cacochymical Perſons and in thoſe who are obnoxious to Convulſive Affections, thoſe Medicines are given to provoke the *Ephidroſis* or ſweating forth; for whilſt that they meet with the acid ſaline Particles of the Humours, and are combined with them, they unlock the joynting together of the Blood, and alſo by reaſon of an heterogeneous mixture agitate its Maſs; hence that the Seroſities may be more eaſily ſeparated, and brought outward thorow the Pores of the Skin, they are preſcribed in the form of a Pouder, *Bolus* and Liquor, *1. Which are of a fixed or volatile Salt.*

Their Forms.

Take of the Flowers of Salt Armoniack ϑß, of mineral Cryſtal *gr.* xv, of Bezoartick Pouder ϑj, mingle them, and let it be given in a Spoonful of Sudorifick Water. *1. Powders.*

Take of the Salt of Tartar ϑj, of the Ceruſs of Antimony *gr.* 25, make a Pouder, let it be given after the ſame manner.

Take of the Pouder of Bezoartick mineral ϑj to ʒß, of Gaſcoins Pouder ϑj, make a Pouder, let it be given in like manner.

Take of the Ceruſs of Antimony ϑj to ʒß, of the Flowers of ſalt Armoniack ϑß, make a Pouder.

Theſe may be given in the form of a Bole by mixing the aforeſaid Doſes with Treacle, Mithridate or Diaſcordium or with the Extract of *Carduus*, Gentian, or the like. *Boles.*

Take of *Bezoarticum minerale* ϑj, of the Flowers of *Sal* Armoniack *gr.* vj, of Mithridate ʒß make a *Bolus*.

Take of the Salt of Harts Horn *gr.* viij, of Bezoartick Pouder *gr.* xv, of the extract of Treacle ϑj, make a *Bolus* or Pills iij.

3. If more convenient in a Liquid form. Take of the ſpirit of Harts Horn or of Soot or of ſalt Armoniack drops 15 to 20 in a little draught of Sudorifick Water from ʒiij to ʒiiij, let it be taken with governance. *Liquors.*

Take of *Sal* Armoniack Flowers ϑß, of the Salt of Tartar *gr.* 15 of ſudorifick Water ʒiij, mingle them and make a draught.

3 Diaphoreticks, which have for their *Baſis* nitrous Salt, are wont to help almoſt in the ſame Caſes or thoſe above made of fixed and volatile Salt; for as much as they deſtroy the Powers of the acid Salt, and ſo diſpoſe the miſtion of the Blood, that whilſt it ferments, its *Serum* and excrements may be more eaſily ſeparated and ſent away. *3. Whoſe Baſis is Salt Nitre.*

Take of Cryſtal mineral ʒiij, of the Salt of Harts Horn or of Soot or of Vipers ʒj, mix them, the Doſe ϑj to ʒß in ſome fit Vehecle.

Take of *Sal Prunellæ* ʒij, Bezoart mineral or ceruſs of Antimony ʒj, make a Pouder the Doſe ϑij to ʒj.

4. Diaphoreticks whoſe *Baſis* is an acid Salt cheifly prevail againſt the Powers of fixed Salt, and Sulphur. When at any time the Maſs of Blood becomes *4. Whoſe Baſis is an acid Salt.*

Part I.

too much ſhut up or bound faſt by reaſon of the ſaline fixed Particles being combined with the ſulphureous and terreſtrial, that it will not eaſily let go its ſeroſities to be ſent away by ſweat (as ſometimes is wont to be in continual Fevours and the ſcorbutick affection) the acid Salt in the given Medicine meeting with a fixed ſalt in the Body, and ſnatching it into its embraces, takes away its wicked Combinations, and ſo unlocks the fermenting blood, and diſpoſes it to an *Ephidroſis* of ſweating diſpoſition.

Powders. Take of the ſpirit of Tartar ʒß to ʒj, of ſudorifick Water ℥iij, of the flowers of *Sal* Armoniack ℈ß, mingle them.

Take of the ſimple Mixture ʒß to ℈ij, let it be given in a ſpoonful of Treacle or Bezoartick Water.

Take of Bezoartick Vinegar ℥ß to ℥j, of *Carduus* water ℥ij, of Plague ʒvj, mingle them, and make a draught.

5. Sulphureous Diaphoreticks. 5. Some things merely or for the moſt part ſulphureous, are commonly ranked in the Claſs of Diaphoreticks. As for example, ſome natural Balſoms and others made, alſo chymical Oyls, and chiefly of *Guaicum*, Box, Camphor, Hartshorn, and Soot, alſo the reſinous extract of the more ponderous Woods with many others, which although they effect little by themſelves to the provoking of Sweat, yet being conjoyned with other Salines, I think they may not be altogether unprofitable; for as much as in a frigid Conſtitution, and too phlegmatick, the ſulphureous Salines do rarefy the too watry blood no leſs than the ſpirituous, and diſpoſe it to be evaporated more freely.

Take of Opobalſom *gut.* vj, to xij. of Baulm water or ground Ivy ℥iij, of Sudorifick Water ℥ß, let it be taken every morning for many days for the provoking the *Ephidroſis* or evacuation by ſweat. It is convenient for pthiſical people and for Ulcers in the Reins.

In like manner but in a greater Doſe is given, the Peruvian Balſom, alſo the tincture of Tolutan Balſom, alſo drops of compounded Balſoms.

Pills. Take of the Reſine of *Guaicum* pouder'd ʒij, of the chymical Oyl of the ſame ℈j, of Bezoartick Mineral, and Gum *Guaicum* of each ʒjß, of Peruvian Balſom what will ſuffice, make a maſs for Pills, Doſe ʒß to ℈ij, drinking after it a doſe of ſudorifick Water, of a decoction of Woods.

The preparation of the Bezoartick Mineral.

The Chymical Preparations of ſome Diaphoreticks, and the Reaſons of them.

Bezoarticum Minerale.

Take of the rectified Butter of Antimony ℥iij, pour to it by drops as much of the ſpirit of Nitre or Stygian Water: abſtract it with the heat of Sand, pour it on again, adding of the ſame *Menſtruum* anew ℥j, and then abſtract it again repeating it three or four times. The matter being taken away and pulverized, let it be calcined for an hour in a Crucible, then let it be edulcorated by waſhing, and likewiſe by enflaming it three or four times with the ſpirit of Wine, the Doſe ℈j to ʒj.

The Reaſon of it. It is worth our obſervation in this preparation, that, whilſt theſe moſt ſharp Liquors are put together preſently their Salts meeting one another are ſtrictly combined; in the mean time the ſulphureous Particles, which abound in a great quantity, are wholly excluded, and being ſet at liberty fly away, and carrying away with them ſome ſaline little bodies, they ſtir up heat and (as if ſomething were burnt in the Act) a very ſtinking fume; then theſe being gone away, the remaining Saline with ſome earthy Particles of the Antimony are more ſtrictly combined, and at laſt having paſſed the fire, that the emetick Sulphur may wholly exhale andthe corroſive prickles of the Salts be deſtroyed, they make a renowned Diaphoretick;

phoretick; for that the divers Salts of the Medicine, do meet with the ſalts of our Bodies, with which whilſt they are united, the joynting together of the blood and humours are laxed, that there may be a way opened for the going forth of the ſerous ſuperfluity; by the very like manner as when the ſpirit of Nitre being poured upon the butter of Antimony, (as alſo the filings of Steel put into *Aqua Fortis*) ſtirs up a great ebullition with heat, and a black fume; for as much as the ſulphureous Particles, whilſt the Salts are combined, fly away in heaps as it were from an inkindled fire. And that an actual flame is not here inkindled, the reaſon is becauſe very many ſaline Particles aſcend together with the ſulphureous; from which theſe are on all ſides ſeparated, leſt that they going cloſe together they ſhould flame forth. Part I.

The *Bezoarticum minerale* may be more compendiouſly prepared after this manner. The Butter of Antimony being infuſed in Spring water, let it be precipitated into a white powder called *Mercurius Vitæ* which being dryed, let it be leaſurely put to *Sal* Nitre fuſed in a Crucible, and ſuffer it to flow for a quarter of an hour. Afterwards it being ſoluted by the often affuſion of Spring water on the Nitre, a white and fixed *Calx* will remain, which notwithſtanding, although it be uſurpt for a Diaphoretick, is far different from the Bezoartick Mineral, becauſe in this, the ſalts of the *Menſtrua*, by which the virtue of the Medicine very much depends, are almoſt quite waſhed away: yea that comes nearer to the nature of Ceruſs of Antimony, or rather ſeems to be the ſame with it.

2. Antimonium Diaphoreticum.

2. Diaphoretick Antimony.

Antimony twice or thrice calcined with an equal weight of Nitre, then being melted in a Crucible, either let it fuſe for ſome time or a fire coal being flung into it ſo long as it makes a thundering noiſe, untill the Sulphur be wholly conſumed, a *Calx* conſiſting almoſt only of Salt and Earth, and imbued with fiery Particles remains: which, when ſweetned (as the manner is) by frequent ablution becomes a mere *Caput mortuum* or inſipid earth. And although it hath the name of a Diaphoretick, yet I know not to which its of Particles to attribute this virtue, and we have often in vain expected ſuch an effect from this Medicine. For the ſtopping the fluxions of the *Serum* or blood, it hath been often given with ſucceſs, for that this Earth being deprived of its proper Salts, it imbibes (which perchance it meets within our Body) acid Salts; ſuch an Energy *Crocus Martis* being prepared by a reverberating fire ſeems to obtain as we have elſewhere intimated.

The Reaſon of it.

The Ceruſs of Antimony being prepared out of its purer part, to wit, the *Regulus* being calcined with Nitre, is only its *Calx* more pure, or leſs defecate. In whoſe preparation Tartar is added, becauſe the *Regulus* is endued but with a little Sulphur (without which the Nitre will not flame) wherefore that the Calcination may be the better performed, there is need of the addition of Tartar which abounds with ſulphureous Particles.

The Ceruſs of Antimony.

3. *The Flowers of* Sal *Armoniack.*

3. The Flowres of Sal *Armoniack.*

Take of *Sal* Armoniack powder'd ℔j, of the filings of Iron ℥xij, being beaten together and mixed, let them be diſtilled in a Retort with a wide neck with a reverberating fire increaſed by degrees: a yellowiſh Liquor, which is the ſpirit of the Salt, will drop forth into the Receiver, and the flowers will be ſublimed partly into the neck of the Retort and partly to its ſides, which gathered together let them be kept in a glaſs, the doſe is *gr.* v to xv.

This operation is performed by mixing *Sal* Armoniack with Colcothar waſhed, alſo with the *Calx* or ſalt of Tartar, their volatile Particles being freed from their bonds may eaſily aſcend. Thirdly, that the Flowers, whilſt they aſcend, ſomething of another concrete, to wit, of Steel, Copper, or ſalt of Tartar, being carryed with them, may be impregnated with its virtue. When this ſublimation is performed with Iron, or the *Calx* of Tartar, from the *Caput mortuum* of either Tinctures are gotten of no contemptible uſe, with the ſpirit of Wine.

The variation of this preparation.

4. *Spirit*

Part I.

4. *Spirits of* Sal *Armoniack.*

4. *The Spirit of Salt Armoniack.*

Take of Tartar calcined with Nitre, and of *Sal* Armoniack, of each ℔iij, let them be pounded by themſelves, and then mixed and put into a large Cucurbit, pouring thereon of Spring Water ℔vj or viij, and ſo diſtilled in a ſand Furnace. The Spirit will aſcend with the leaſt heat, pure, and very penetrating without any taſt of Fire: If you rectifie this in a deeper Cucurbit, the moſt pure volatile Salt will be ſublimed into the Alembick.

The reaſon of the Proceſs.

The Reaſon of this proceſs is this, Salt Armoniack is made of a volatile Salt, out of Soot and Urine, and Sea Salt, all which when they are combined in the ſubliming, the ſaline volatile Particles, being wholly caſt off from adhering to their wonted ſulphureous, are ſo fixed to the Sea-ſaline Particles, and entred into ſuch a condition, that they cannot fly away. But as ſoon as this bond is looſed, *viz.* when this compounded Salt being diſſolved with the ſalt of Tartar in water, is intimately mingled, the Particles of the ſea Salt do ſtick to the ſaline-fixed of the Tartar, and for that cauſe the volatile being diſmiſſed from their embraces, and ready to fly, do moſt eaſily aſcend: But that the Spirit being diſtilled from the *Sal* Armoniack, hath no ſtinking ſmell as the *Stagma* of Soot or Urine, the reaſon is, becauſe in that compoſition the volatile Salt, by the intervention of the Sea Salt, is caſt off with certain ſulphureous Particles; which when Soot or Urine is diſtilled by themſelves, ſtick pertinaciouſly to the volatile Salt, which may plainly appear by either of their ſtinking Smells: Then moreover, becauſe the liquors ſtill'd forth from thoſe Concretes are at firſt limpid and clear, afterwards yellow, and at length become red and black and dark, *viz.* for that the ſulphureous Particles being firſt ſubjugated by the ſaline and hidden, leiſurely riſing up, unfold themſelves, and overcome the others.

The ſpirits of Sal *Armoniack, alſo as the ſpirit of Harts Horn and others of that ſort are cleared of their ſulphureous Particles.*

And by what Reaſon.

But that in the compoſition of *Sal* Armoniack, the Particles of the Sea *Salt*, of the Urine, and of the Soot, do drive away the ſulphureous part, and fix the volatile Salt, alſo by this experiment (which the famous *Zuelferus* found out for the fixing of volatile Salt) it may manifeſtly appear: As for example ſake.

Take of the volatile Salt of Vipers, Urine, or Harts Horn at your pleaſure what you will; this being put into a ſtreight Cucurbit and ſhut cloſe at the Orifice, excepting a very little hole, drop in drop by drop the ſpirit of Sea Salt, to the height of two or three fingers breadth, until all the Salt be diſſolved: Filter this ſolution, and draw it off in a Cucurbite to dryneſs, in the bottom will remain a Salt of a good Odor, ſomewhat ſharp and of a ſaline taſt; whoſe uſe is highly commended for many diſeaſes. Beſides this I have further experienced, to wit, that, if thou ſhouldſt recover thy volatile Salt, you muſt put to this, ſalt of Tartar, and ſublime them in a Vial; and the moſt pure volatile Salt will aſcend. After this manner you may ſo rectifie the ſpirits of Soot, of Harts Horn, and of Blood, that their ſulphur being wholly driven away, they may become more grateful and leſs corruptible Remedies.

How this ſpirit may be diſtilled with quick lime and a lixivium *of Aſhes.*

The ſpirit of *Sal* Armoniack alſo may be diſtilled by other means, *viz.* if at any time a ſolution of this Salt ſhould be mixed with a *lixivium* of fixed Salt or of quick Lime in equal parts; for by theſe and perhaps by certain other means, whilſt the particles of the Sea Salt do enter into new conjunctions, the former fly away. In like manner it is about the diſtillation of Urine, as is ſhewed in its proper place.

5. *Spirit of Soot, Blood, Harts Horn,* &c.

5. *Spirit of Soot of Harts Horn,* &c.

Take of ponderous ſoot of burnt wood, ſhining with a blackneſs like pitch, what will ſuffice, that may fill an earthen Retort above the middle; then a large recipient being made fit, let the diſtillation be performed by a reverberatory Fire increaſed by degrees to a moderate heat; ſhortly the ſpirit will aſcend in a whitiſh fume, then a yellow Oyl with a volatile Salt, and laſtly a blackiſh Oyl, let the Salt be collected by it ſelf, the remaining Liquor being ſeparated from the black Oyl by filtration, muſt be rectified by diſtilling it twice or thrice in *Balneo Mariæ* or in ſand;

ſand; alſo the volatil Salt being depurated by rectifying it in a deeper Cucurbit may be kept for uſe. The Doſe of the Spirit from drops 12 to 20: Of the Salt, from *gr.* vj to xij or xv. Part I.

Little pieces or ſcantlings of Harts Horn, may be diſtilled either after the ſame manner by a naked fire, or in a Glaſs Retort in a ſand furnace: In like manner Spirits are drawn out of Skulls, Bones, and Blood, with a volatil Salt, and a ſtinking Oyl.

6. *Spirits and Reſinous Extracts of* Guaicum, *Box, and of other ponderous Woods.*

6. Spirits of Guaicum, *Box, and ſuch like.*

Theſe ſorts of Woods are deſervedly ranked with Diaphoreticks, becauſe ſudoriferous Decoctions are chiefly prepared from them. Their Hydrotick or Sweat-cauſing virtue ſeems to conſiſt both in a ſaline and ſulphureous Principle; for that theſe bodies are abundantly full of Particles of either kind. Wherefore beſides the common way of preparing by Infuſion and Concoction, thoſe active principles, to wit, of Salt and Sulphur are brought forth by themſelves by a chymical preparation, and being reduced into peculiar Concretes, to wit, Spirit, Oyl, Reſine, they make elegant pleaſant and more efficacious Diaphoreticks.

1. *Spirit and Oyl are gotten after this manner.*

Take the duſt of *Guaicum* ℔ij, diſtil it with the fire of a reverberatory, or in a ſand Furnace with a ſtrong heat; a ſharp Liquor will come forth, and ſomething acid, and a yellow Oyl and black: Laſtly, ſeparate this and rectifie the reſt in a Cucurbit, you will have a clear ſpirit, and of a ſharp odour, and alſo a yellow ponderous Oyl, which will ſubſide in the bottom of the watriſh Liquor. The Doſe of the Spirit ʒß to ʒjß, of the Oyl *gut.* vj to xv in a convenient Vehicle.

Either Medicine is a Diaphoretick, and uſed with ſucceſs in the Dropſie, Scurvy, and Venereal Diſeaſe, without doubt the ſaline part of this Concrete, which is partly in the *fluor* and partly volatil; conſtitutes together with the Phlegm a ſpirit ſo called, and the ſulphureous part is the more pure yellow Oyl, which by reaſon of a portion of Salt adhering, is heavy and ſinks down; yea certainly ſulphureous Particles do ſtick cloſe to the Spirit, or acid-biting *Stagma*, and therefore it always ſtinks, and quickly forſaking its limpidity, it degenerates into yellow and red. The black Oyl conſiſts of Salt, and of a more thick ſulphur that is mixed with a portion of Earth. In *Guaicum*, the ſaline Element as to the greateſt part, is carried beyond a fixity into a ſtate of flowing and of volatility; wherefore a *lixivium* of its Aſhes ſhews but little of Salt. It is far otherwiſe with Tartar, whoſe ſaline Particles are ſome only in a flux, and ſtate of volatility; many notwithſtanding remain fixed.

The Reaſon of it.

7. Reſine of *Guaicum* is gotten after the ſame manner as the Reſine of Scammony or Jalap, to wit, the Tincture is extracted with the Spirit of Wine, then it is abſtracted to the middle, and the water poured into a Cucurbit, the Reſine will be precipitated in great plenty, which being dryed up and powdered, it may be given from ʒj to ʒß, with other ſudorificks in a ſolid form.

7. Reſine of Guaicum.

It thence appears that this Reſine is the ſulphureous part of the *Guaicum*, becauſe that after its extraction if you ſhall diſtil the remaining *Magma* or dregs in a Retort in hot ſand, or with a naked fire, you will have Phlegm and an acid Liquor in its wonted proportion, but the Oyls will come forth in but a very little quantity only. Wherefore it may be lawfully concluded from the ſpagyrical *Analyſis* of this Wood, that the Chymical Elements, what and how many ſoever they be, as we formerly aſſerted elſewhere, are indeed mixed; and not (as ſome ſay) to be from experiment only apparently produced.

The Reaſon of it.

Part I.

8. *Spirit of Tartar.*

Take of choice white Tartar and shining, washed and dryed (or rather as *Zuelferus* prescribes, soluted and at one time crystallized) ℔iiij, distil it in a Retort with a large Receiver, the Fire being increased by degrees, until the fumes do wholly cease : You will have Phlegm, Spirit, yellow and black Oyl. This last being separated, the remaining Liquor being put into a Glass Cucurbit, let it be rectified twice or thrice in hot sand, by extracting every time a third part only. The Dose is of the Spirit ʒß to ʒj, of the Oyl ℈ß to ℈j, in a prepared Body, they move sweat sufficiently.

The reason of the Preparation.

This is no place for us to deliver fully the *Genesis* and *Analysis* of Tartar, worthy of much consideration : But that we may briefly touch upon its Anatomy, this Concrete consists of very much Salt, (whose Particles are very many in a state of fixity, and some in flowing, and of volatility) much Sulphur, a little Spirit and Phlegm, and moderate Earth. In the distillation the volatile Salt ascending with the Spirit, renders the Liquor somewhat biting and pricking; which moreover by reason of the plenty of fluid Salt and Sulphur, is a little acid and so notably stinks, that it can scarce get a good odor by any rectification. As to the contents of this extilled *Stagma*, it differs not much from the product of *Guaicum*, unless that the Spirit is less acid, and does not so readily dissolve Coral and shelly things; but there is a great difference between the dead Head of this and of that, because very little of fixed *Sal* is elixiviated from the ashes of *Guaicum*, and very much of it from the *Calx* of the Tartar. The reason of which appears from what was said before.

Chap III.

Of too great or depraved Diaphoresis *or Sweating, and its Remedy.*

As our Life is in a continual flux, therefore as new things ought to be added and put to it, so old and out-worn things ought continually to be drawn and carried away from it: Wherefore that all superfluous and incongruous Particles whatsoever, may be perpetually moved away; there are manifold ways of departings and excretions; in the doing of which, however Nature oftentimes knows not a measure, and goes either on this side or beyond, that which is most commodious. How it behoveth us to correct or moderate those Evacuations, which leading inward from the circumference or exterior compass of the Body, do purge forth by a certain particular Sink, as often as they offend in excess or in defect, we have shewed above : The way of our method requires now, that we also shew a Remedy, if that at any time the *Diaphoresis* or evacuation by sweating, (which tending from the Centre towards the Circumference, is the chief general and diffusive Excretion) should be too much or depraved.

Excessive sweating is a frequent Affection.

And indeed that this sort of affection doth too often happen, is obvious enough to common observation ; for that there is nothing more usual, than that those labouring with the Phthisick or Scurvy, and others that are hardly recovered out of long Fevers, yea some without any disease or evident *prophasis*, live obnoxious to assiduous, and oftentimes very great Sweats. Therefore concerning the *Ephidrosis* excessive, we will enquire first how many ways, and from what causes such an Evacuation may arise : Then we will shew what Remedies, and what kind

of a manner of Administrations are most convenient in every case of it.

Part I.

As to the first of these; often and immoderate Sweating is sometimes a Symptom of some other present Disease; for this is familiar (as we said but now) in the Phthisick and Scurvie: the reason of which is this, to wit, that when the Blood being corrupted either by some impure Miasm, or having got an evil disposition, doth not rightly concoct and assimilate the nourishing Juice continually suffused into its Mass, it sifts out and casts forth adoors by Sweat that do far degenerate, heaped up to a fulness together with other excrements.

Sometimes it is a symptome of another Disease.

The Cure of this Sudation depends wholly on the healing of the Disease whose Symptom it is; in the mean time concerning this as much as belongs to the manner of Living, a profitable and necessary Indication is taken from that Symptom, to wit, that when nightly and copious Sweats happen in those Diseases, a Diet should be prescribed altogether of light aliments, *viz.* milk Grewel, Barly Cream and such like, whose light and soft Particles the bloody Mass may bear, and not of Flesh, or stronger Meats.

2. An excessive *Ephidrosis* is sometimes an effect of another past and gon Disease, as when it succeeds long Fevours: for so it still happens that fevourish burnings do terminate in hydrotick Dews (as an hot Summer ends in a rainy Autumn) that scarce any one can recover from a long Disease with this indisposition remaining; which notwithstanding is moderate and easily to be cured in some, but in others more grievous, and not less infestous than the Disease whose offspring it was. I knew a young Man, who growing well after a quartan Ague of ten Months, when he began to want his Fitts, he daily melted into so profuse Sweats, that he was necessitated to change his Shirt and Sheets all wetted (as if they were dipped in Water) thrice every Night. By reason of this Evacuation continuing so for many Weeks, his Flesh so fell away, and his strength was so exhausted, that he was almost reduced to the dryness of a Skeleton. He, when he had used a long time various Remedies without any benefit, at length by the drinking Evening and Morning of Asses Milk, and his other diet being ordered of Cowes Milk, grew well in a short time.

2. When also it is an Effect.

A notable example of excessive Sweating.

In such like Cases the Blood perpetually casting back its contents, and as it were vomiting them forth by the mouths of the Arteries, presently cast forth adoors not only the Chyle suffused from the *Viscera*, but moreover supping up again for its Food both the nervous Juice, and the Farciments or fillings up of the solid parts, by and by loathing all those together, with the nutritious Liquor, expells them by the Pores of the Skin.

The reason of it.

The chief Cause of this Disease seems to consist in the dyscrasie and debilitie of the Blood; for as much as its Liquor like sower Milk is apt to be continually fused, and precipitated into serosities; wherefore both its proper meltings, and also the humours which are poured in from any other place that cannot indeed be assimilated, are forthwith separated, and when the Pores of the Skin are very open, are sent forth adoors by *Diaphoresis* or sweating rather than by any other way of excretion. But that the Blood is disposed so into fusions or fluxes, for the most part the cause is the Dominion of the fluid or acid Salts (even as in sower Milk) in its Mass. But sometimes the nervous Juice degenerated into a sowerness is first and rather the fault, for by that reason its Acid Excrements being chewed over again in the Blood, do fuse its Mass, and precipitate it into serosities: further from such a cause we do Judge the *Diabetes* and the English Sweat so called (becaus it was here general) to have had their origin.

The cause of excessive Sweating.

Partly from the vitiated Crasis *of the Blood.*

This kind of excessive *Ephidrosis* is not wont only to arise from the vitiated *Crasis* and fermentation of the Blood, but sometimes by reason of its depraved Enkindling. It hath been already shewn by what means the Blood breaks forth into Sweat feavourishly growing hot by reason of the exces of Sulphur. Moreover this Symptom sometimes follows no less by reason of the Defect of Sulphur: for when that the Blood being impoverished, and made more watrie is less enkindled, therefore as often as it is urged into a more rapid motion by an acquired heat, or agitation of the Body, there will be a necessity that its serosities (becaus they cannot be consumed by heat, or insensibly exhaled) should be resolved into Sweat. Sulphur is wanting in the Blood either becaus it is consumed, as after long Feavours, or becaus it is not enough generated by reason of lack of Sustenance. We may observe this latter not only in many men who being strait

Partly from its lack of Heat.

Part I.

ned for Food or using a Lenten Diet, presently fall into an *Ephidrosis* or sweating by a more quick running or walking, but remarkably in Beasts, who when they are fed with Grass or new Hay sweat very much, and quickly languish with any Labour.

Its Cure. As to what belongs to the Cure, hidden *Ephidrosis* or Sweating by reason of the aforesaid Causes, and *Prophasis*——the Therapeutick Intentions are chiefly these three, *viz*, First to take away, or mend the Dyscrasie or evil Disposition or the Debilitites of the Humours. Secondly a little to bind up the too open Pores of the Skin. Thirdly to derive the *Serum* of the Blood and the watry Excrements towards the Reins.

1. The first Indication. 1. The first of these is performed by these sort of Remedies which destroy the Powers of the acid Salt in the Blood or nervous Juice, also which may promote (if perchance it should be defective) the Exaltation of the Sulphur. For *To take away the evil dispositions of the Humours.* which ends, *Antiscorbutes*, *Chalibeates*, also Medicines indued with a volatile, nitrous and alchalisate Salt do oftenest give help. We will shew you some forms of each of them.

Electuary. Take of the Conserves of the Flowers of Chichorie, Fumitory of each ℥ij of the Pouder of Ivorie, Harts Horn, prepared Coral of each ℥j, of Pearls ʒß, Species of *Diarrhodon Abbatis* ℥j, of *Lignum Aloes*, yellow Sanders and red Sanders each ʒß, of *Sal Prunellæ* ℈iiij with what will suffice of Syrup of Fumitory, make a Confection, let them take the quantity of a Walnut in the Evening, and first in the Morning, drinking after it of the following Julep or of the Distilled Water ℥iij.

Julep. Take of Fumitory water, of simple Walnut water of each ℥vj, of Snales, of Worms, each ℥j, of Sugar ʒvj, mix them and make a Julep.

A distilled Water. Take of the Tops of the Firr Tree, Tamarisk, Cypress of each Miiij, of Mirtle Mij, of Leaves of water Cresses, Brooklime, Liverwort, *St. Johns* Wort, Harts Tongue, Betony, of each Miij, of the exterior Rinds of 12 Orenges cut and brused: pour them into *Brunswick* Beer ℔viij, distill it in ordinary Stils, mix the whole Liquor and sweeten it at your pleasure, the Dose is ℥iij twice a day.

An Expression. Take of the Leaves of Sowthistle, of water Cresses, Plantane, Brooklime, each Miij, being brused pour them into the aforesaid distilled Water ℔j and make a strong expression, the Dose ℥iij to iiij at nine a clock in the Morning and five in the afternoon.

Chalibeates. According to this Method I am wont to prescribe in the failing of strength and nightly Sweats after long Fevours, but if these remedies help not, we then must come to *Chalibeates*.

Syrup. Take of the Syrop of Steel ℥vj, let it be taken one Spoonful in the Morning and at 5 a Clock with the Water above prescribed ℥iiij.

A Pouder. Take of the Pouder of Ivory, of Coral prepared each ℥ij, of the *Crocus* of Steel, of the Salt of Steel, each ℥jß, make a Pouder, the Dose ʒß, twice a day with the same distilled Water ℥iiij.

Tinctures. Take of the Tincture of the Salt of Tartar ℥j, the Dose *gut.* 20 to 30 twice a day with distilled Water. After the same manner may be given Titcture of Coral, also Tincture gotten from Gumms and Balsams. Further in these cases the Spirit of Harts Horn, of Urine or Soot are oftentimes given with success.

The second Intention consists in the alteration of the Pores. The second Intention for the Cure of excessive Sweating consisting in the due Constitution of the pores is performed for the most part only by Exterior Administrations; for which end are prescribed anoyntings of the whole Body with Oyles of Almonds, of Palm, Oyntments of Orenge Flowers and such like, yea Linnen dyed with these are worn. Sometimes Bathings in cold Water or in the River, and sometimes the change of the Air are convenient. As to the use of these (which is known commonly enough) we need not prescribe any particular Governance.

Of the Affection which is commonly called an Aptitude to catch Cold. But here it seems very opportune, to speak a few Words of a certain Affection troublesom to Sweating or at least regarding the excessive or inordinate *Diapnoe*. I have oftentimes observed some to have had the Pores of the Body (or the Organs of Transpiration) disposed in that manner that they are hurt by nothing more than by the unaccustomed Blast or Approach of the Air; in so much that when in good liking and well in flesh also as to Appetite, Sleep, and having

having the right strength of their Members, they seem sound or well, yet they were not able to bear naked the least Blast of Wind or Air, but presently there followed a great Perturbation of Spirits with a failing of all the Faculties and an indisposition of the whole Body; which kind of Irregularity so lightly Contracted they cannot either quickly or easily shake off, but hardly, and not but after a long time recover their former healthful Condition: Those proclive to this Dyspathy or Infirmity fear the Air more then others do Fire or Water. Hence some dare not go forth adoors, others living within a close Chamber suffer neither Door or Casement to be opened, and if by chance a little Breath of Air get in by some hidden chink, they presently feel it, and are hurt by it. I have known some from such a cause fixed for many Months in their Bed. I remember a Footman healthful and strong enough, who for above ten Years never went out of his Chamber, nor could be perswaded to it, nor hired at any rate to go forth: and when afterwards the House being on fire he was drawn out by force, he was very dangerously cast down by it for very many Months without any other hurt: others are affraid to stand or walk upon an Earthen Floor or Brick or Stone Pavement, for that they are wont thereby to contract great hurt very many other the like cases every where happen, to whom further this infelicity is added, that few commiserate those that are so affected, neither are they believed to be sick indeed but only in Imagination.

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Its Description.

That we may a little therefore search into the nature of this Affection, we think that it is not for nothing that they complain, but without doubt they feel a certain pain or trouble in themselves inflicted by the received Cold, or by the altered manner of transpiration, but that it may appear what it is, and in what the reason of it consists, it behoveth us in the first place to consider, by what ordinary means the Particles of the ambient Air get into the Pores of our Skin, and affect the subjects of them, to wit, the Animal Spirits diffused every where over the Superficies of the Body. For indeed as they are of a certain etherial disposition or Nature, these appear to be greatly refreshed, and to be stirred up into as it were a flattering Expansion by the neer of kin particles both of the Air and Light, whilst those come proportionate to them: and in like manner the Blood, whilst that it passes thorow in its Circuit, the exterior Border of the Body, exhales even there as in the *Præcordia* by the Mouths of the Arteries its Mists or Smokes, and receives by the gapings of the Veins the sulphureous Food for the sustaining its Flame. For these benefits both of the Blood and of the animal Spirits, the Pores of the Skin are conveniently made and ought to ly open in that manner, that the Particles of the Air and Light in a moderate plenty being somewhat refracted, and with a gentle sliding to, might strike the outmost Borders of the substance of either of them. For otherwise if there should be an improportionate approach of the agent to this or that patient or to both together, presently perturbations arise in this, or that, or together in either part of the Soul. For if the out-dwelling Spirits are either weak, or infirm of themselves and quickly dissipable, or by reason of the Pores of the Skin lying too much open are exposed to the more sharp and naked air, it still comes to pass that they are forced upon every light occasion into flights and distractions; and for that cause Griefs, Convulsions or resolutions or unbindings are stirred up here and there, not only about the exterior parts of the Body; but sometimes, from taking Cold (as they use to say) a falling down of the whole Body (which is not quickly or easily raised up) succeeds. And indeed from thence the aforesaid inordinations about the *Diapnoe* do chiefly arise, for as much as the sensitive Soul, being either not strong or not munited enough, lyes too open to injuries of the external Air; and so is disturbed at its more strong approach in this or that part, or together in its whole *Hypostasis*, and is forced into irregularities not presently to be recovered. Further hence also the flamie part of the Soul is wont to be affected and moved, by consent no less then by its proper passion or Idiopathie because of an improportionate incountring of Air. For that the Fibres, and nervous Branches being carried into Corrugations and Convulsions, the Sanguiferous Vessels twining about them are by them variously straitned, that for that reason the Blood is compelled into inordinate fluctuations. Moreover the bloody Mass by it self very much purges forth its evills both as to its inkindling, and also as to the disposition of its depraved transpi-

The reason is searched into.

By what means both the Blood and Spirits are affected by the encompassing Air.

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ration. In respect of the former the vital flame growing about the superficies of the Body, is wont to be compelled by its more sharp or hard blowing into noddings and trepidations and various inequalities, which shake the whole Soul. Then it is commonly enough known that there is nothing more can endanger the mixture of the Blood than a vitiated *Diapnoe* or transpiration: for hence Fluxes, and precipitations in the Mass of its serosity arise, from which happen Catharrs, Coughs, Asthmatical, Nepthritick, and Arthritick Paroxysms.

From the aforesaid Affection Symptoms proceed.

From these it will be easie to draw forth the formal Reason and also the causes and cures of this Affection of which we now treat. For that any one may contract from cold, or from the incountring of the naked air any where in this or that member, pain, or numness, or Palsy, it so comes to pass because the animal Spirits flowing among the membraneous Fibres being struck and put to flight, are agitated into distractions: but if that more amply from such a cause the *Languor* of the whole body, and casting down of the strength do happen, not a private handful or Band of the Spirits but their whole *Hypostasis* or the intire sensitive Soul seems be stricken; which being strucken and so contracted into a lesser compass and made shorter, it sinks down within the Organs of the Body, and suffers its faculties to flag. Besides these, if that a tumor of a little continuance, or a *Phlegmon*, the Toothach, Cough, or Pleurisy, happen to any one unwarily exposed to the Air, or if cold, heat presently following, and feavourish burnings arise, it is a sign that the Blood is no less affected by the improportionate approach of the Air than the animal Spirits, and therefore its Liquor being disturbed in motion and enkindling is either disposed to fevourish Effervescencies, or being loosned in its mixture it is compelled into various fluxes and precipitations of the serous Juice. It would be an immense and tedious labour to describe here all the Affections or Diseases which owe their original to such a cause. Hence proceed the Headach, *Vertigo*, the sleepy Diseases, the Pose or stuffing of the Head, the Squinzy, the Inflammation of the eyes, Cough, Vomiting, Looseness, and abundance of other Diseases; in so much that the common people are wont to refer the evident causes almost of all Diseases to these two kinds, to wit, surfeting and taking cold.

The Procatarxis or predisposition of the aforesaid Disease consists.

Hitherto we have described the formal Reason, and conjunct causes of depraved transpiration. As to what respects the *Procatarxis* or predisposition, for which some sooner than others are apt to catch cold, I say this consists in the vitiousness or default of the animal Spirits, or of the Blood, or of the Pores, of one of these, or of more together.

1: *Partly in the Spirits.*

The Animal Spirits are sometimes in the fault, because being weak they are not able to suffer any thing that is hard or sharp which may come to them from without, but presently at the approach of the naked Air they are thrown into flights and distractions, even as many after long sickness abhor to be in the open air, and assoon as they are exposed to the Sunbeams very often fall into relapses: further sometimes the Spirits incline this evill to sweatings, for as much they being degenerate and having gotten a sharp and unquiet Disposition, they are carried by every blast of Air into irregularities, wherefore those who by reason of the spirits being so disposed do become Hypochondriacal, also obnoxious to the Affection which we have described, are troubled with cold upon every light occasion.

2: *Partly in the Blood.*

2. The Blood disposes to an habitude of depraved transpiration for a twofold reason, *viz.* both in respect of its temperament and of its mixture. As to this latter, oftentimes the joynting together of the Blood is so lax and loose, that upon every small cause and chiefly by reason of the approach of a cold or moyst Air, it is cast into fluxions and precipitations of its serosities, in so much as those indued with such blood dare not go forth adoors at all, yea scarce look out. But the sanguineous Mass as to its temperament being often very hot and vaporous, exhales highly sharp and penetrative *Effluvias*; by which, whilst the Pores of the skin are too much unlock'd and laid open, both the spirits and the vital flame are exposed more than they ought to the injuries of the naked Air and Winds.

3: *In the evil constitution of the Pores.*

Thirdly, the evil constitution of the Pores produced by sickness or by other means, or also being natural and born so, very much inclines to that habit of depraved sweating. For if those passages being too open do almost always gape wide, the Blood and Spirits in the whole or in some parts are not enough defenced against the encounter of the external Air. Such an amplitude of Pores is natural, and bred in some, as those who are indued with soft and loose flesh, have their skin for the most

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most part thin and very full of holes: besides it is wont to be frequently contracted by various accidents: after a sudorifick Diet long continued, also after frequent sweatings which use to break forth about the declinings of Fevours, the Pores of the skin being extended and laid wide open to the utmost for a long time, they afterwards continually gape, and almost always remain more open.

Its Cure.

This Disease although it doth not threaten Death, yet because it renders life very troublesome or altogether unprofitable, it highly deserves a Cure: for which endeavour the curatory Intentions are chiefly these three, *viz.* First that the Debilities, or dejections or impoverishments both of the Spirits and of the Blood may be cured. Secondly, that the Dyscrasies of either of them (if perchance there be any) may be taken away. Thirdly, that a due conformation of the Pores may be procured.

1. *The first Intention, a Corroboration of the Spirits.*

The chief point of this Business lies about the first Intention, for as much as it respects the strengthning of the animal Spitits or the making larger of the whole sensitive Soul: But unless the Patients are perswaded to assume a certain Confidence, that they may go forth adoors to exercise their utmost strength, and to endeavour to accustom nature daily to more sharp and hard things, all Medicine will be in vain; wherefore there will need a plentiful way of living and alacrity no less than of Medicine, to wit, that the plenty of animal Spirits may be daily restored and increased, and moreover thereby made more firm for bolder attempts: for which end generous Wines with good fare moderately taken are very requisite Further Studies and Cares (whereby the Soul may be depressed) being omitted, the time must be spent in leasure and recreations or moderate exercises. By such a way of living rightly instituted, as the animal Spirit is comforted, so the decay and impoverishment of the blood is restored.

For the same ends also these following Medicines may be profitably administred.

Spirits.

Take of the spirit of Amber, Armoniack, what will suffice, take *gut.* 15 to 20 in the evening and in the morning first, in a spoonful of the following distilled water drinking after it nine spoonfuls of the same.

A distilled water.

Take of the leaves of Sage or Rosemary, Thyme, of Savory, of Marjoram, of Costmary of each M. iiij, of the Roots of Angelica, of Imperatory of each ℥vj, of Zedoaory, of Galingal the less, of the aromatick Reed, of the Florentine *Iris*, of each ℥iß, of Cubebs ℥iß, of Nutmegs, Cloves, Cinamon, of each ℥j, of the outward Rind of twelve Oranges and of six Lemons, being cut and brused, put them into white Wine and Canary ℔iiij, and distill them in common stills, let the whole Liquor be mixed and sweetned with refined Sugar. In the distilling, hang at the nose of the Still in a little bag Amber Grease ℈j, Musk ℈ß.

Tinctures.

Take of the tincture of Antimony or of Tolutan Balsom ℥j, take of them *gut.* 15 to 20, in the morning about nine a clock and five in the afternoon, in a spoonful of the aforesaid prescribed water, drinking after it ℥iij of the same, or rather in the morning a draught of Tea or of Coffee or of Chocolate with Sage boyled in it.

A little before dinner take a draught of Xeroeuse Wine.

When these have been for some time used and that it seem good to intermit them, take in their place these following.

In the place of the Spirits take a Dose of the following Electuary morning and evening with distilled Water or Viper Wine.

Electuary.

Take of wet candied Citron pill ℥iß, of candied Mirobalans ℥j, of Nutmeg and Ginger candied of each ℥ß, of *Confectio Hamech*, *Alchermes* of each ℥iij, of prepared Pearls, red Coral prepared each ℥iß, with the syrop or the juice of *Alchermes*, make an Electuary.

Physical Ale.

Let him drink for his ordinary drink Medicated Ale made after the following manner, *viz.* put into a Vessel of four gallons this following Bag.

Take an old Cock half boyled, and cut into small Pieces, of Sage and Hartstongue dryed, of each Mij, of Dates cut vj, of the shavings of Sassafras ℥ij, being cut and brused mingle them, make up a little bag with them and put it into the Vessel after it has worked.

2. *The second Intention the amending the humours.*

2. The second Intention undertaking the amendment of the Dyscrasies of the depraved dispositions of the Spirits, and blood, is performed by the same remedies which are convenient for the Hypochondriack and Melancholy Affection;

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on; wherefore those prescriptions formerly deliver'd by us for the cure of those Affections may serve here.

3. The third intention, the alteration of the Pores.

3. Concerning the third Intention which appoints for the right conformation of the Pores of the skin as for its due cloathing airs, fires and means of living, there is little left for a Physitian. For the deseased fearing themselves and their strength according to their own Imaginations, do so cloath themselves, shut themselves in their chamber as in a Cloyster, indulge themselves in a Bed or Fire, even as they are carried by their own *genius* harkning to no precepts of their Friends or of the Physitian. Whatsoever others counsel them about those things they reject, objecting their own experience and knowledge taken from what doth help and what doth hurt them. The means of Advice which I received from them, and is wont to help, is but one almost, that they change the Air and Soil, by which they do not seldom change also their mind. For although they are addicted to close houses or to a chamber, when as being carried to forrain parts they breath a more warm and serene air, it is scarce credible how soon they grow well. So much for perverse and depraved *Diapnoes* or transpiration. The Theory of which Affection we have therefore shewed more fully because it hath been left untouched by others: now we will return from whence we have digressed to excessive *Diaphoresis* or sweating.

The third kind of sudation which is a Disease by it self.

There remains yet a third species of this Affection, to wit, immoderate sweating, which is not as the former a Symptom or effect of another present or past Disease, but is a Disease of it self or beginning from it self, or is the Parent of a morbid Affection. To the first Rank especially belongs that pestilent sweating, in time past, general among our Countrymen, known thorow the whole World by the name of the English Sweat, into the reason of which we shall by and by search. But, that we say nothing here of the bloody, black, bluish, stinking, or sweet smelling Sweat, of all which mention is made by Authors worthy to be believed, (and some of which also have fallen under our observation) we often advertise that some without any manifest cause do fall into the habit of *Ephidrosis* or of sweating, and from thence that evacuation being increased daily sometimes grows immeasurable; in so much that the humidities of the whole Body seem to be poured forth by sweat. And indeed it is no wonder that this Affection being once begun should increase daily; for those sweating much or often are very thirsty, and for that reason drink hugely, and so the more they drink the more they sweat, so that these two are reciprocally the cause and effect by turns and so produce one another in a long *Series*.

A notable story of it.

There is yet living in this Kingdom a noble Lady, famous now for many years for an immense or rather stupendious *Ephidrosis*, for that she does not only every night, moysten or thorowly wet her Linnen and Bedcloaths, but besides distills into a bason put under her thighs many ounces, yea according to common fame many pounds of mere Sweat; in the mean time there is a necessity by reason of continual thirst provoking thereto, to take more plentifully of liquid things, by which as strength is restored so the sweat is continued. I received the History of this admirable affection, both from many worthy of belief, and (although she did never consult me for the recovering of her health) from the sick Ladies own mouth. However she had taken Remedies from many Physicians, and had tryed divers ways of living and the Regiment of the six non-naturals, she had drunk almost all kinds of Waters, had tryed the Air of others Countries and especially of *France*, but for all that she could do, this notable Lady doth yet labour with this troublesome distillation. Although it will not be easy for me to shew the Reason of this case, I being ignorant of what hapned in the beginning, progress and alterations of this Disease. What was to be observed from things helpful or hurtful, and only seeing her once, speech was had of it only by the by: yet however it may be lawful to

The reason of it.

suspect that in this, as in other Instances of Nature, the *Serum* of the blood, being too apt to go away, leaving the passages thorow the Reins, Lymphæducts, *Glandulas* and other ordinary ways of excretion did affect this by the Pores of the skin occasionally begun, and afterwards facilitated by a certain habitude, and constantly to observe it; to which perhaps may be added that the potency of the fluid Salt in the Blood and the nervous Juice, might cause a continual fusion of the blood, and a more plentiful separation of the *Serum*. To the curing of this Disease, when it being confirmed by a continual habit, and the œconomy of Nature being wholly inverted by it, I know not whether any Remedy, or any Method of

curing

curing would be profitable. And certainly nothing would be proposed by me if I should by chance speak to her about it. But if that great Remedy for a vitiated *Diapnoe* or Transpiration, to wit, change of air, should be repeated, they should not go any more into *France*, but into *Denmark* or *Sweedland*.

Part I.

Of the English Sweat.

It will be very apposite to this business to discourse a little of the English Sweat, sometimes past peculiar and very deadly to our Countrymen, both at home and abroad. But this Disease hath not been seen in an Age, and that an example of it hath been made known to us only by the writings of others, we shall not go about to raise any *Hypotheses* about its nature and causes, but after having described its History out of Authors only propose by way of commentary our conjectures.

The History of the Disease.

The English Sweat began in the Year 1485 about the beginning of *August* and lasted to the end of *October*; and although *Sennertus* said that this evill was familiar and continual for 40 years one after another to this Region, yet our own Countrymen both Physicians, and Historians, who then lived or neer that time, have observed that it had perfect and great intervals, and that it returned only four times in the space of 66 years, *viz.* 1506, 1517, 1528, 1551, and that it raged scarce above six months at any time, and that there was always a very wet season going before it. But in some of those years in which it raged, it made every where great slaughters, that in some places, every time of its Reign the third part of men were found wanting. So great was its malignity that so soon as it invaded any City, it took away every day five or six hundred, and scarce one hundred of all the sick would escape.

An example of the Disease out of Sennertus.

I think it good to insert here an example of the Disease compendiously and methodically described by *Sennertus*, and consonant to our own Authors. Those who were taken with this Disease, were presently dispatch'd without long languishing, a *Bubo*, Carbuncle, or Pimples, and grew weak in mind with a great *Languor* of strength with unquietness, palpitation of Heart, headach, frequent quick and unequal pulse, with great palpitation of the Heart; and also they flowted with abundance of sweat and perpetually, which ended not till the Disease was at an end which hapned within twenty four Hours. For those who would not be pleased with sweating, nor used Cordials, and who bore the heat more impatiently, and took cold, they all suddenly dyed within twenty four hours. Afterwards when the reason of this Disease became known that the sick were drawn to sweats, and did fortify themselves with Cordials, fewer died. *Sen. de feb. Lib* 4. *Cap* 15. Concerning its cure *Polidor Virgil* writes a little more accurately. After many experiment sand observations taken from things helpful and hurtful to the sick, by use they found out the prompteſt Remedy for every one to be after this manner. If any one were taken with this sweat in the day time, he presently went to Bed with his cloaths on, if in the night and in Bed he then rested quiet, nor moved himself from the place till twenty four hours were past; in the mean time, he cover'd himself so with cloaths that the sweat might not be provoked, but that it might still forth of its own accord softly, he took no meat if he were able to fast so long nor any more of drink he was accustomed to, and that warm, than might be just enough to extinguish thirst, in this cure the chief thing was that he did beware of taking cold, or so much as to put his hand or foot out of the Bedcloaths for a little air, for to do it was deadly. Others added that in the whole twenty four hours space he was to abstain wholly from sleep. This Disease because it was wont in so short a space to terminate in Life or Death was called by the Physitians an *Ephemera* or Fevour of a days space. Those who recovered from this pestilent Sweat, after they had sometime continued well, sometimes fell into it again, yea sometimes a third time.

Its Cure described.

Out of Polidor Virgil.

The Season of it inquired into.

That we may presume to deliver a Reason of this dire Affection from these *Phænomena*, let it first be lawful for us to suspect the formal Reason and also the conjunct Cause of this pestilent *Ephidrosis* to consist in this, that the Blood being infected with the meeting of a certain malignant or venomous matter, and for that cause being presently dissolved in its *Crasis* and fused into serosities, therefore for the most quick expulsion of this virulent Mixture it is resolved into Sweat as the most universal and most ample manner of excretion; whereby indeed if perchance it hapned by this secretion that all the venomous Particles were presently driven forth adoors, the Disease presently terminated in health, or otherwise, very frequently in Death.

But next to it ought to be inquired into whether this malignant matter is be-

got

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got first in the Blood, or poured into it from some other place. If it be said the former it will be supposed, the Mass of Blood to have acquired an unquiet putrefactive *Diathesis* even as in the Plague by reason of a malignant Constitution of the Year and Air; which afterwards breaks forth either of its own accord, when it is brought to a plenitude, or by contagion, as it were enkindled into a dangerous and ofttimes corruptive Turgescencie, but I cannot suspect the business so in this malignant Sweat, as this in the first place shews that no signs of a corrupt or much vitiated Blood occur before in or after the Fit. For besides that this Fevour not very intense wants Spots, Pimples, Buboes and other Marks of an envenomed or very much fermenting Blood, moreover it is terminated in a Night and a Days space, which scarce ever is wont to happen in Diseases deeply radicated within the bloody Mass.

The primarie Cause.

In the nervous Juice.

Wherefore I am rather led to believe the evil of this Disease to be primitively founded in the nervous Liquor, and from thence to be communicated to the Blood whilst it performs the Tragedy of that malignant *Ephidrosis*. For it seems that this Humour, watring all the Fibres of the whole Body, and being the Vehicle in all places of the animal Spirits, by reason of the intemperateness of the Year leaving its due *Crasis*, to wit, a volatile saline Spirit degenerates into an acetous Nature, or some more vitious and at length malignant Disposition; and as this comes to that state of Depravation, then either of its own accord by reason of plenitude or excited by reason of the Ferment of Contagion, it conceives a turgescency or Flux being shaken forth from those irritated parts, and flowing back into the sanguineous Mass, it presently impoysons the whole, and dissolves its joynting, and by and by that it might be expelled it incites into that very great eccritick Effervescency. Hence copious Sweats (because this is the next and most ample way of excretion) break forth; by which extream strugling of Nature if perchance it happens that the whole Poyson be sent forth again from the Blood into the habit of the Body, and thence cast forth every where by an universal, and for a while continual *Ephidrosis*, Health quickly shines forth as fair Weather after the Clouds are wholly discussed; but if by that fermentation, and endeavour of Secretion into which the Blood is stirred up, for the sake of expelling the malignant *Miasma*, the venomous Particles are not suddenly and wholly cast forth, the Mass of Blood both in a manner deprived of the *Serum*, and undone in its *Crasis*, not being able to be longer continued to a vital Flame, it vanishes.

The reason of the Symptomes.

From these it is not hard to give the reasons of its Empirical Cure and to assign the Causes of the Symptoms. For that the Disease being urgent, or about the beginning of its assault before the Fevour seems to be inkindled, presently an unwonted Languor, a defection of the Mind, an utter overthrow of strength, pain of the Head, Palpitation of the Heart, with a quick, frequent, and unequal pulse, and other affections of the nervous kind did infest the sick, it was a sign that the nervous Parts were affected before the Blood, and that from them that evil deduced its original.

2. As a more copious Sweat (which was sometimes both symptomatick and also critick) did arise about the beginning of the Fevour being otherwise in many others, the reason is, that the morbifick *Latex* or Water redounding from the Fibres and nervous Parts into the bloody Mass, for that cause it is presently at its first approach cast forth, nor suffered to stay any longer or to be intimately mingled with the Blood. For indeed in a state not very unhealthful, the nervous Liquor scarce ever agrees with the Blood: wherefore if at any time by certain turns that does flow back into this, it is by and by shook out again; and before it is infected with a lixivial Tincture being sent away by the Reins excites a flood of Limpid Urine, which we have informed you to happen indeed often in Convulsive Affections. But if the degenerate, or depraved nervous Liquor doth continually flow into the Blood, it produces sometimes the unbloody Dysentery, such as we have already described, sometimes the *Diabetes* as we formerly shewed. But by reason of the lesser and private restagnations of the same Humour, we have formerly shewed that cancrous, running, scirrhous, or knotty, and other Tumours of an evil kind do arise. But indeed in the Disease we now speak of, that nervous Liquor is truly so very malignant and pestilent that at the first touch it empoysons the Blood, and fuses it into serosities,

From the like case out of which this Disease springs, the unbloody Dysenterie and the Diabetes arise.

to be sent away quickly by Sweat; for otherwise if it were permitted to stay in the bloody Mass for a few Hours and to circulate and be thorowly mixed with it, it would wholly corrupt, and plainly mortifie it. Hence in that method of curing, there is so great Caution found by frequent experience, that from the first assault of the Disease, the Sick immediatly (not staying whilst their Cloathes may be pulled off and put into Bed) being covered with bed Cloathes are put to Sweat, and continue for 24 Hours an equal *Ephidrosis* excited in the whole Body, and are not suffered in the mean time to stir neither Hand nor Foot, nor to take food nor sleep; that is they may do nothing whereby that pestilent *Latex* may be any more, or intimately mixed with the Blood, or whereby its most quick and total exclusion might be hindred. That if this kind of quick plentiful and equal Sudation stirred up by the instinct of Nature, and regulated by Medicine may be so long continued, that the whole Poyson may exhale thorow the Pores of the Skin, the afflicted presently grow whole without any cutaneous breakings forth, gentle Feavour, long Infirmity, nightly Sweats and other Consequences of Vitiated Blood. But for as much as the nervous Liquor after its corruptions so purged forth, is apt to be depraved again after the same manner, and so being moved by reason of plenitude or contagion to redound from the nervous Parts into the Blood and in like maner to impoyson it; therefore some after they have been perfectly well have usually been taken a second time, yea sometimes a third with the same Disease. There will be no need to add any forms of Medicines in this Case, because the whole business of the Cure, almost wholly depends on the right ordering or administring of the Sick. Besides it would be very impertinent to prescribe Physick, and a method against so unwonted a Disease which we hope will never return again, and if that it should ever return hereafter, it is uncertain whether the same way of curing ought to be observed in all things.

Part I.

Why those who are recovered from this Disease are obnoxious to fall into it again.

Part I.

SECT. VI.

CHAP. I.

Of Cardiack and Alexiterian Medicines or Cordials and Antidotes againſt Poyſon.

Cordials and Antidotes againſt Poyſon were always of common uſe.

IN ancient Medicine, and alſo in our yet Vulgar and Empirical, which old Women and Quackſalvers exerciſe, Medicines called Cordials and Antidotes againſt Poyſon were always of moſt publick uſe and of a great Rank. The ſimples of theſe are moſt numerous, their Compoſitions add to the heap, and almoſt fill all the Pages in all the Diſpenſatories both Ancient and Modern. But what has reſpect to the reaſons of their Effects and the way of operating, *viz.* upon what kinds of Particles their Virtues depend, and by what affection either of the Heart, or Blood, or Spirits, or of the other Humours they exerciſe their Powers, concerning theſe I ſay, I find nothing ſaid by Phyſitians or Philoſophers which might at any time ſatisfie a Mind deſirous of Truth. For the unfolding the Virtues of Cardiacks, they do not as in the other part of medicinal Cure inſiſt upon the ſenſible and manifeſt Qualities, but they run to the Occult and Specifick, yea to the Actions of the whole ſubſtance; In the mean time if the thing be attentively conſidered, and the true and genuine Reaſons of it be ſearched out, it will eaſily appear, that the notion it ſelf of a Cardiack Remedy is very unfitly framed, and is but a vulgar Error.

Their vulgar Attributes.

The Cardiack Remedies are eſteemed to be of that ſort, which ſuccour the Heart labouring after any manner of way; wherefore it is every where ſaid in Authors theſe do notably comfort the Heart, that keeps the Heart unhurt from all putrefaction, yea others relieve the weak or oppreſſed Heart, Cure its fainting, or trembling, and preſerve it from Corruption. Moreover becauſe in the Peſt, Small Pox, and malignant Fevours, it is believed that the Heart is corrupted or beſet with Venom or malignity, therefore Remedies, which are wont to give help in thoſe ſickneſſes, are not only called ſimply Cordials but *Alexiterions* and *Alexipharmacas* that is Preſervatives or Antidotes againſt Poyſons.

From whence remedies which defend life are called Cardiacks.

This opinion both of Cardiack and Alexiterian Medicines, ſeems to have riſen from thence, for as much as in times paſt it was thought and is commonly believed, that the Heart is the beginning of all Life and Heat, and for that cauſe that our Life or Death depends upon its immediate Affection: Hence whatſoever things do refreſh the Soul and make us lively and chearful, they are believed to do that, for as much as they are benign and friendly to the Heart; and on the contrary, others to induce ſadneſs and melancholy, for as much as they are enemies and incongruous to the Heart.

Theſe do not act properly on the Heart.

But indeed when as we have ſhown more largely elſewhere, that the Heart is not the ſubject of Life, but that it is chiefly and almoſt only the Blood, and that the Soul it ſelf (upon whoſe exiſtence and action of the Body, Life depends) is founded partly in the Blood and partly in the heap of animal Spirits, it eaſily follows that the Remedies which conſerve the Life whole, or reſtore it being in danger, do reſpect theſe parts of the Soul, to wit, the Blood and the animal Spirits, rather and more immediately than the Heart: For this is not ſo noble and principal an Inward as it hath been hitherto eſteemed, but a mere Muſcle conſiſting only of Fleſh and Tendons, after the manner of the reſt, and ſerving for the driving about of the Blood: But as often as it is deficient or wanting in rightly performing this Office, this is not its proper fault, but happens by the evil either of the Blood or animal Spirits by which it is actuated. Therefore

Therefore that the reaſons and manner of working of Medicines which are called Cordials may be known, it behoves us to conſider theſe two things, *viz.* Firſt, by how many or by which ways chiefly, the Blood being amiſs as to its inkindling, or as to its mixture, and not ſeldom being in danger, requires helping Medicines, by which it may be preſerved or amended. Secondly, by what means the Heart, by reaſon of a defect or fault in the animal Regiment, is hindred or perverted from its due motion, and wherefore Medicines which plentifully increaſe, and more rightly compoſe the Spirits, are preſcribed.

Part I.

But in the Blood and animal Spirits.

As to the Firſt, the Blood in reſpect of its accenſion either is deficient or exceeds; and in either reſpect divers manner of Medicines, to wit, hot or cold, as it were, Oyl or Water are required; and therefore they are commonly called Cordials, although they affect not at all the heart: For although from theſe being taken the motion of the Heart is oftentimes altered, and for that reaſon the Pulſe becomes preſently quicker or ſlower, ſtronger or weaker. Yet this is made ſo, becauſe the motion of the Heart depending altogether upon the in-flowing of the animal Spirits (by a wonderful conſent and cooperation between either part of the Soul) is exactly proportionated according to the accenſion or inkindling of the Blood: Wherefore as the Blood intends or enlarges, or remits or leſſens by taken in Medicines its efferveſcency or heat; of a ſudden the animal Spirits which agitate the Heart, obſerving exactly its condition, make the Heart to ſhake quicker or ſlower, and ſo if from the ſame Medicine a *ſyſtaſis* of the animal Spirits be effected, therefore alſo a greater or leſs ſtrong or vehement Pulſe is cauſed, when as in the mean time the virtue of that Medicine reaches no more to the Heart it ſelf, than to the Hand or Foot or to any other Muſcle: Therefore that the firſt claſs of Cardiacks whereby the enormities of the Blood are healed, may be inſtituted, it will behove us to weigh by how many, and by which ways its Liquor is wont to be perverted and depraved, both as to its accenſion and as to its *Craſis*, then what kind of Remedies commonly eſteemed Cardiacks, are required for every one of its evils.

How in the Blood.

In the firſt place therefore, the Blood ſometimes is not enough inkindled, nor is circulated with vigor, as is obſerved in many languid perſons, to wit, ſuch as linger with a long egritude, or ſuch as have had great flowings of the Hemorrhoids, or other immoderate Evacuations, or broken with old Age; alſo in ſuch who are very pale and cold in their extreme parts; with a weak Pulſe and decayed ſtrength. The Reaſon of which is, for that the Blood by reaſon of the ſulphureous Particles being too much conſumed or depreſſed, becomes almoſt vapid and decayed; and from thence is ſo very ſparingly and ſmally inkindled in the Lungs: To which oftentimes is added, that the animal Regiment alſo flagging or growing weary, the Heart being deſtitute of a more full influx of Spirits, does not enough exagitate the Blood, whereby it might more lively ferment, and be inkindled.

The Blood offends as to its accenſion and Craſis.

1. *When it is leſs inkindled than it ought to be.*

The Remedies to be given in this caſe are generous Wines, Hot Waters, or more mild diſtilled with Spices, aromatick Powders, Species, and Confections, Chymical Oyls and Spirits, Tinctures, Elixirs, and other things endued with ſpirituons and ſulphureous Particles, which do more agitate the Blood, and render it more inflammable and turgid; and as they together raiſe up and comfort the animal ſpirits; therefore they make the Heart to beat more lively and ſtrongly. The Forms of theſe are ſet down at the end of this Chapter.

What Remedies are preſcribed.

Secondly, oftentimes the Blood by reaſon of ſulphureous Particles, too much ſoluted and conſtrained into an efferveſcency; is inkindled more than it ought to be, and diſperſeth too ſtrong an heat and very tronbleſome through the whole Body: Wherefore that it ſo very much rarefied and flaming forth, may be contained, and at the ſame time fanned within the Veſſels, the Heart ſtriking vehemently and ſwiftly, drives about the Blood with great labour and ſtriving: Therefore in this caſe there ought to be adminiſtred cooling and temperate Cardiack Remedies, which may quench and allay the fervor of the Blood, and alſo gently refreſh the animal Spirits whereby they may be able to be more ſtrong to perform the preſent task of Life: To which ends are wont to be uſed diſtilled waters of Burrage, Balm, of Couſlip Flowers, Marigolds, the Rinds of the whole Citron, alſo the Syrups and Conſerves of the Flowers and Leaves of the ſame kind of Vegetables, the juices of Sorrel, Citrons, Oranges, mineral Cryſtal, and ſuch like, to which Opiates are very often joyned with ſucceſs; for the force of the Heart

2. *What alſo when too much enkindled.*

Part I.

being ſomewhat reſtrained, the Blood more eaſily and ſooner remits its effer-veſcency.

2. The Blood offending as to its Craſis *or mixture, requires only Cardiacks in Fevers, and then*

Theſe are the more ſimple Cardiacks, which are deſigned to effect only one intention, to wit, the raiſing up or the depreſſing of the ſanguineous Flame. But moreover the Blood is not only wont to be depraved and diverſly perverted as to its inkindling, but alſo as to its mixture or *Craſis*. But yet Cordials are not preſently required to all its dyſcraſies, but only in thoſe which being excited in Fevers when they are ſudden and very great, do threaten a total corruption of the Maſs of Blood.

It is either too ſtrict in its joynting,

1. The Blood growing feveriſhly hot, is indangered as to its *Craſis* chiefly two ways, to wit, either the band of its miſtion is too ſtrict, ſo that all its Particles are complicated within themſelves, and are mutually combined ſo as the unprofitable and excrementitious cannot be extricated or ſeparated from the profitable, and the thin from the thick; as happens in ſome continual and putrid Fevers, which although they are little or nothing malignant, yet becauſe they are not able to be judged upon by ſweat or tranſpiration, they ſometimes are terminated in death: Wherefore in this caſe they are preſcribed for Cardiacks, which unlock and open this joynting together of the Blood, to the end that the ſerous *Latex* with other recrements, may abſcede and be ſent away from the concretion of the reſt.

Or too looſe.

2. The *Craſis* of the Blood is beſides in danger to be ſubverted by another and quite contrary way in Fevers, and for that reaſon other kind of Cardiack Remedies, *viz.* *Alexipharmacas* or *Alexiterians* are preſcribed: For truly it often happens that its joynting together is too much laxed, and as to its *Craſis*, torn aſunder by heterogeneous Particles, either begot within its own proper boſom, or elſe poured in thither from ſome other place, ſo that the common bond of its miſtion being looſened, it goes away every where into parts, and then portions of the coagulated or extravaſated, and ſtagnating Blood being fixed here and there, begin to putrefie and corrupt, and at length the whole ſanguineous Liquor becomes ſo much vitiated, that it is not fit any longer to continue the Flame, or for the animal Spirits diſtilling into the Brain: Wherefore there will then be a neceſſity for all its functions by degrees to flag, and laſtly, Life to be deſtroyed.

What Remedies the latter Evil requires.

Cardiacks in this caſe moſtly requiſite, conſiſt of thoſe kind of Particles, which being carried into the Blood and circulated with it, are however untameable, yet benign: Wherefore whilſt they enter into all the paſſages and pores of the bloody Maſs, they every where agitate the other malignant Particles, pull them from their concretions, and at length either overcome them, or thruſt them forth adoors. And ſo, as the Blood being freed from that empoyſoned mixtion, and alſo delivered from all the private Coagulations, is torn again into very ſmall and elementary Particles, it recovers quickly its priſtine and healthful mixture.

Viz. Alexiterian.

Indeed that it may better appear by what means Alexiterians do conſerve the Blood and juices of our Body from peſtiferous blaſts, or defend them being already touched by them from putrefaction; it behoves us to ſhew how other Liquors obnoxious to putrefaction, are preſerved a long time, or being corrupted may be reſtored again.

How theſe defend the Blood from putrefaction.

Therefore it is obſerved of Beer, that it being apt of its own nature to grow ſower, is made durable by the boyling therein the flowers of the Hop; yea, that common Water, when it otherwiſe quickly putrefies, being impregnated by the boyling or infuſion of bitter Vegetables, (of which ſort alſo Alexipharmacks are made) continues a long time uncorrupted: Beſides that the juices of Herbs and ſome other Liquors being already putrefied, if that they may be fumigated by the burning of Sulphur, will recover their priſtine vigor. Moreover, that Wines, Beer, and other kinds of Drinks, being almoſt vapid and dead; being anew ſtirred by a fermentation within them do often revive: The reaſon of which is, for that as the corruption of every thing conſiſts in the looſening of the elementary Particles and their going away one from another, whatſoever detains them, tending to flight and confuſion, yet in motion and perfect mixture, preſerves that Concrete whole and ſound. Further, if any thing in like manner compels together the Elements being looſened, and mutually about to go one from another, and ſtirs them up into a new fermentation, it drives away putrefaction from the

Concrete

Concrete although begun, and gives to it again a firm Conſtitution. Theſe kind of alterations and preſerving Liquors by art from Corruption, is known by every Plebean; and indeed in the Plague and malignant diſeaſes, Alexipharmacks ſeem to perform the ſame effect: For theſe being often taken, for as much as they continually agitate the Blood. and compel it into an higher fermentation, they conſerve its mixture whole, notwithſtanding the influences of the hurtful *miaſmata*: Yea after the malignity being impreſſed, and the *Craſis* of the Blood after the aforeſaid manner, being begun to be laxed and looſened, theſe ſort of Remedies being given even to a moving a *Diaphoreſis*, for as much as they decoct the *Miaſmata* of the received infection, and induce a new fermentation oppoſite to the other corrupt one, they oftentimes obliterate the impreſſions or the force of the peſtiferous infection. The kinds and forms of theſe ſort of Alexiterian Medicines, are ſet down hereafter.

Part I.

In the mean time, as to what reſpects theſe other Cardiacks, by which the too ſtrict joynting of the fermenting Blood is looſened and unlocked, for the ſending away the the feveriſh matter and other Excrements, that the vertues and means of the operating of theſe may be better known, what we have above ſaid concerning the energies of Diureticks and Diaphoreticks, ought to be referred hither. For in truth, thoſe Medicines are of a very near kin to ſome Cardiacks, yea are ſometimes of common or reciprocal uſe, for as much as ſometimes the vitiated *Craſis* of the Blood cannot be relieved, unleſs that firſt its joynting being unlocked, there be a way laid open for the ſending away the ſerous water by the Reins or the Pores of the Skin. Salines do beſt of all perform every of theſe ſcopes of healing: For as we have oftentimes already noted, the opening of every Body both liquid and ſolid, is effected almoſt only with a ſaline Key.

What ſort of Cardiacks are preſcribed in the too cloſejoynting of the Blood.

We have experimentally declared in the Chapter of the *Diureſis*, how by reaſon of the various infuſions of Salts, the coagulation of Milk and its reduction from that ſtate or inhibition are performed, and what analogy they have with the Blood; even as in Milk and in the fluid Blood, ſo likewiſe is it in fixed Metals, and other Minerals: For the Concretion or Compaction almoſt of every thing is from the ſalt of one kind, the diſſolution by ſome of another, which ſnatches into its embraces the firſt Salt, and ſo a precipitation is made by ſome Salt of a diverſe kind whhich deſtroys the combinations of the former. We have before declared theſe things ſo clearly and largely, that there will be no need to repeat them here. That therefore we have placed Salines in Cardiacks, no leſs than in Diureticks and Diaphoreticks, the ſame reaſon is for all: It now remains that we briefly ſhew what are the chief *ſpecies* which belong to that Rank or Cenſe of this kind, and the reaſons and ways of their operating.

They are chiefly ſalines and of a diverſe kind.

1. In the firſt place therefore, Cardiacks endued with a volatil Salt, offer themſelves and carry away the palm from many others, as the ſpirits of Harts-horn, of Salt Armoniack, Compounds, *viz.* of Amber and Treacle diſtilled from the Roots of the *Virginian Serpentaria*, and other Alexiterians, alſo what was the only and univerſal Medicine of a late Doctor, a Phyſician going over to the Empirical Sect, the ſpirits of dead mens Sculls dug out of their Graves. Hither alſo ought to be referred the Salt of Vipers, alſo the powder of Toads cloſely calcined, (which I knew very famous and beneficial formerly, in the epidemical peſtilential Fever at *Oxford* in the Year 1643.) with many others. Theſe ſorts of Remedies have called back many from the very jaws of Death, and indeed they are often very beneficial in a diverſe and manifold reſpect, *viz.* Firſt, for as much as they open the maſs of Blood, too much thickened and ſtraitned by a feveriſh effervescency, by meeting with the fixed or acid Salts, and ſnatching them into their embraces; and ſo they promote a ſeparation and excretion of the morbifick matter, both beſides that they relieve the animal Spirits, and ſtir them up when ſlothful to the performing their duty. To which we may add, that theſe Medicines in malignant Fevers do overcome, and not rarely extinguiſh the venomous Particles of the morbifick Matter.

1. *Cordials endued with a volatil Salt.*

2. The ſecond place among ſaline Cardiacks, ought in right to belong to Remedies endued with an Alchaliſate or petrifying Salt, for theſe are eſteemed commonly famous Cordials. Of theſe ſorts are the *Bezoar*, Stone, Pearls, Corals, the bone from the Heart of a Stag, the Horn of the ſame Beaſt, the powder of an Elephants Tooth, the Eyes and Claws of Crabs, and other ſtony and ſhelly Powders,

2. *which are powerful in an Alchal or petrifying Salt.*

Part I.

ders, which common Experience witneſſes to be very often given with ſucceſs: And the reaſon of the help ſeems to conſiſt in this, that the Particles of the Alchal Salt in the Medicine, meet with the Particles of the acid Salt in our Bodies, and by and by they intimately joyn together, and ſo deſtroy their fierceneſſes, and any other wicked combinations. To the claſs of theſe ſort of Cardiacks alſo *Bolus Armenius*, Lemnian ſealed Earth, and other Marls are deſervedly ranked, not therefore however, that they ſuccour (as the vulgar ſay) the ſick Heart, but for as much as they deſtroy the powers of the acid or fixed Salt, either in the *Viſcera* or in the maſs of Blood, and preſently allay or correct the enormities produced by them.

3. *In a fluid or acetous Salt.*

3. If I ſhould exclude from this Rank of Cardiacks acetous Medicines, or endued with a fluid Salt, the Authority almoſt almoſt of all Phyſicians, and eſpecially of the Ancients, would riſe up againſt me: For theſe for the moſt part are eſteemed famous Alexiterians againſt the Peſtilence. For the curing of malignant Fevers, Theriacal and Bezoartick Acetes are highly cryed up, yea Vinegar or acetous things are put into waters diſtilled for that uſe. For the ſame reaſon the ſpirits of Vitriol, the juices of Citrons, of Pomegranates, of Wood-ſorrel with many others of the ſame kind, are eſteemed in the number of Cordials and *Alexipharmacons*; and indeed by good right, becauſe theſe do beſt of all diſſolve the combinations of the fixed Salt with the aduſt Sulphur, and overcome their fierceneſſes; and therefore by theſe ſort of Remedies, the coagulations and extravaſations of the Blood that are wont to happen in malignant Fevers, are often prevented or cured.

4. *In a fixed Salt.*

4. For the ſame or the like Reaſons, by which the aforeſaid ſalines, others alſo whoſe *baſis* is a fixed Salt, are numbred with Cardiacks, or are put into their compoſitions: For that as divers ſorts of Salts are begot in our Bodies, and that they paſs every where from one ſtate to another; hence it is that they ought to give for every intention, ſalines not of one but of a diverſe kind. By what reaſon thoſe endued with a fixed or lixivial Salt, take away or correct the enormities of the acid Salt reigning in the *Viſcera* and the Blood, we have ſhown before.

5. *In a nitrous Salt.*

5. Salt Nitre by good right is ranked with Cardiacks, ſeeing that without its Particles inſpired with the Air the Life of Animals could not ſubſiſt: But this being taken inwardly at the Mouth is eſteemed a famous *Antepyreuticon*, for as much as it takes away the thirſt, and greatly allays the feveriſh heat, which notwithſtanding it effects, not only by helping the miſtion of the Blood but alſo its accenſion or enkindling. We have elſewhere ſhewed, that for the making of flame, together with the ſulphureous Particles, nitrous are required, and by how much more plentiful they are, the more clear and bright it burns. Wherefore when the matter enkindled, which conſiſts for the moſt part of Sulphur, with Salt and Earth mixed together ſends forth but an obſcure flame vitiated with Smoak and Soot, if that Nitre be caſt in, it preſently becomes ſplendid and temperate and ſhines forth with a brightneſs. In like maner we think it to be in Fevours when the Blood, being ſtuft with aduſt Feculencies, fumes forth with a ſuffocating heat, rather than openly flames forth, Particles of Nitre being taken in at the mouth, and carried into the blood, by and by make it to burn more clearly and is therefore beneficial or benign: to the end that the joynting of its liquor being more opened, its excrements both ſerous and fuliginous may go away freely. Wherefore our *Verulamius* truly obſerves that the Particles of Nitre being carried into the Ventricle and alſo inſpired together with the Air conduces very much to the maintaining and the prolonging of our Life.

Theſe are the chief kinds of Cardiack Medicines, whoſe operation is chiefly upon the Maſs of Blood, whoſe cloſe or too ſtrict joynting, and thickning by continual concoction, they ſomewhat fuſe and open, that there may be a way opened for the morbifick matter: or they hinder the Blood from putrefaction being diſſolved by an heterogeneous and malignant mixture, and broken into venemous portions and therefore obnoxious to ſtagnations, and corrupt Coagulations; for as much as the Particles of theſe Cardiack Alexiterions being carried into the Blood, and confuſed with it, in the circulating notwithſtanding not being aſſimilated by it, or overcome, they every where riſe againſt the venomous Particles, and either overcome them, or expel them forth adoors; to the end that the bloody Maſs being

ing freed from all malignity, and extricated from all coagulations, might quickly recover its priſtine Diſpoſition. Both theſe medicines for as much as they preſerve the Blood from corruption, or extinction, are commonly called Cardiacks but may be more properly Vitals.

Part 1.

The aforeſaid Remedies are rather to be caled vitals.

But if it be further inquired into, how theſe, or thoſe being put into the Ventricle, without any notable action, or paſſion there ſtirred up, do ſo ſuddenly transfer their Energies almoſt unmixed into the bloody Maſs: I ſay in the firſt place, that theſe Medicines, are by no means adverſe or contrary, but very congruous or agreeable to the Animal Spirits; wherefore they do not irritate the nervous Fibres of the Ventricle neither into a ſenſe of Grief, nor into excretory Motions; but rather provoke the Spirits inhabiting them into a certain Ovation or Complacency, by whoſe undulation preſently the whole Soul is expanded. Then in the ſecond place the paſſage from the Ventricle into the blood is not, as hath been formerly thought, ſo long, or is carried by ſo many *ambages* or turnings, and windings, that there ſhould be any fear leſt the virtue of the Medicine ſhould be loſt in the way; but in a moment is carried from the ends of theſe into thoſe: For as we have obſerved above, innumerable ſanguiferous Veſſels thickly planted do cover the interior nervous Coat of the Ventricle, by which reaſon not only cathartick Medicines, but whatſoever others being deſtinated for the *Præcordia*, or the Brain, yea for the uttermoſt border of the Body, not being yet gone forth from the Ventricle, do begin their operations in the blood.

How theſe being put into the Ventricle, do by and by operate upon the Blood.

So much for Cardiacks ſo commonly called for that they reſtore the Blood being depraved as to its accenſion or mixture, to wit, either of them or both of them together, or reduce it to a better *Craſis*. Whoſe operation and vertue, as it brings ſuccours to the endangered Life; they (as we have hinted) rather may be more properly termed *Vitalia* or Vitals. But moreover ſome Medicines, that are known by the name of Cordials, for as much as they firſt and more immediately ſhew or exert their Energies upon the Animal Spirits, and ſo they erect, vigorate or compoſe either ſome portion, or the whole *Hypoſtaſis* of the ſenſitive Soul being too much contracted, depreſſed or otherwiſe diſturbed. And indeed theſe ſorts of Remedies do as it were, although more remotely, affect the heart it ſelf: For that when from theſe being given, the whole ſenſitive Soul is elevated, and more largely expanded, alſo the ſpirits deſtinated for the *præcordia*, do flow into them more plentifully, and actuate them more lively; and therefore the Pulſe before weak and flagging, preſently ſtrikes more ſtrongly, and the Blood is driven about with a greater force. Theſe ſort of Medicines being eſteemed by a certain right for Cardiacks, do not much differ as to the matter from other Vitals, chiefly reſpecting the Blood: Yea ſome of them are common to either kind. As to the means of affecting theſe latter, may be aptly reduced to two heads, and for as much as they are either gentle or ſharp, they follow the ſame ſcope, to wit, they either ſet up and confirm as it were by gentle ſtroking and ſoft handling the animal Spirits, or elſe by vexing them and urging them as it were with prickings or Goads, they compel them to more quick and ſometimes to more regular motions,

2. *The ſecond kind of Cardiacks which reſpect the Animal Spirits.*

Theſe are of a twofold kind.

The Cardiacks of the former kind aſſoon as they are entered into the Stomach, yea ſometimes as ſoon as taſted in the Mouth, do put forth their Virtues, and with a grateful approach cheriſh the Spirits dwelling in the firſt paſſages, or as it were the Porch of the Body, or reſtore them; then by their continuity, the ſame rejoycing being delivered over ſucceſſively to other Spirits, and from them to others, it preſently waves thorough the whole chain of the Senſitive Soul; ſo that both the Brain and the *Præcordia* being irradiated by a more full influx of as it were rejoycing Spirits, they perform much more briskly and more chearfully the duties of their Functions. For this end (having a care of a too great incitation of the Blood) they make waters commonly called Cordial Waters diſtilled with Wine or winie Spirits, and with Spices; alſo prepared with Musk and Amber Griſe. Alſo Aromatick Pouders mixed with the ſame. Beſides hither belong the magiſteries of Corals, and Pearls, and Tinctures, alſo Elixirs, and very many others of the ſame kind breathing forth a grateful ſcent or odor: hence alſo ſweet ſmells, and pleaſant ſights for as much as they recreate the animal Spirits are numbred among Cardiacks: for whatſoever doth gently affect and delight the Spirits preſiding in every Senſory, doth by and by raiſe up and amplifie

1. *Gentle ſtrokers of the Spirits.*

which ſort do ſtir up an effect either preſently in the Viſcera, *or in the Senſories.*

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amplifie the whole Soul. In the mean time, other Cardiacks of this Rank without any great affection of the Spirits placed in the entrance, yea the firſt paſſages and maſs of Blood being almoſt unſaluted, are perceived to operate firſt within the compaſs of the Head: Of which ſort are certain Cephalicks ſo called, which when as they are not grateful to the Palat or Ventricle, and do ſcarce ferment or ſtir the Blood; yet they illuſtrate the Brain, and ſharpen and corroborate the animal Spirits dwelling in it. Of this kind ſeem to be Sage, Betony, Roſemary, Vervain, with many others.

Or at length in the compaſs of the Brain.

2. Certain other Medicaments and kinds of Adminiſtrations, (which are not undeſervedly ranked among Cardiacks) do operate after a different manner, and for that reaſon beſtow quite another help; to wit, theſe do not gently ſtroke the Animal Spirits, and make them to be equally expanded; but they rather irritate and compel them to run and be carried forth hither and thither for that end, when that they being before out of order and diſperſed unequally; they abound in ſome places more thickly and in others more thinly; and therefore intermit or perverſly perform certain Duties of their functions, and chiefly within the Brain or *Præcordia:* Then the beſt Remedy is that they be then diſturbed, and more agitated by an ingrateful Medicine; wherefore they being ſtirred up by inflicted Stripes, as it were whipped, leave their former irregularities, and of their own accord return into regular orders: For ſo it is a uſual thing in ſwoonings, Syncopes, Oppreſſion or Convulſion of the Heart; yea almoſt in all other Irregularities, Languors, and Faintings away of the Spirits, to give Spirits of Harts Horn, Soot, *Sal* Armoniack, or the tincture of *Caſtor* or *Aſa fœtida*, with other Liquors. Theſe and the like, as volatil Salts and empyreumatick or ſtrong ſmelling Chymical Oyls to put to the Noſe, is expedient, as alſo in ſudden defections of the Soul, to ſprinkle cold water on the Face, to ſhake very much the Body, to pull the Noſe, and ſometimes to ſtrike or buffet the Body, avails. Theſe kind of Adminiſtrations bring help, for as much as they ſtir up or exſuſcitate the Animal Spirits oppreſſed or diſtracted, or doing ſome other thing beſides their proper Office, and then command them being expanſed, and as it were, ſet again into order, to their former Offices. But that ſome ſuppoſe that help to proceed from hence, for that the Blood being hindred ſomewhere in its courſe, and ſtagnating chiefly within the *præcordia*, brings forth the aforeſaid affections, and is reſtored into motion by thoſe Remedies and means of Adminiſtrations: I ſay, that the cauſe of thoſe Affections and the Cure, depends only ſecondarily and mediately upon the Blood: But that firſtly the ſtagnation of the Blood proceeds from the animal motion of the Heart being ſtopped, and that the impediments of that are not to be taken away, but by the reſtitution of this. The various kinds of Medicines eſteemed for Cardiacks being now rehearſed, and their manner and ways of working on the Blood or Spirits, or both of them together, being (as I think) rightly drawn or deſigned, it yet reſts that we put down ſome ſelect Forms of them, appropriated by Phyſicians to every one of the aforeſaid Intentions.

2. *Or theſe Cardiacks are* aſper *and irritating.*

Which compel the Spirits as it were by whipping them into order.

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Chap. II.

Kinds and Forms of Cardiacks.

BEcauſe we have diſtinguiſhed Medicines commonly eſteemed for Cardiacks into two kinds, *viz.* ſome which chiefly and more immediately affect the Blood, and others the animal Spirits; in their firſt rank we have placed thoſe which are deſtinated for the regulating the enkindling of the Blood, which compel its too cold liquor and ſlow in motion to grow more hot, and being exalted or increaſed with more plenty of ſulphureous Particles, more abundantly to be inkindled and to flame forth: Of which ſort are brisk Wines, ſtrong Waters, diſtilled Compoſitions, Spirits and Tinctures of Saffron, *Elixir Vitæ*, of *Quercetan*, the tincture of ſalt of Tartar, of Steel, and other things filled with Spirit and chiefly with plenty of Sulphur, of which ſometimes theſe, ſometimes thoſe may be taken at the pleaſure of every patient. As often as by reaſon of the Bloods being but little inkindled, and for that cauſe too much heaped up and almoſt ſtanding ſtill within the *præcordia*, a languor and wearineſs of Spirits, with a great oppreſſion of the Heart do infeſt: in this caſe *Aqua mirabilis*, Clove, Cinamon, and Wormwood Waters, compounded with the Rinds of Oranges, and diſtilled with Wine, are convenient. To which is ſometimes added a doſe of ſome Spirit, *Elixir*, or Tincture.

1. *Cardiacks increaſing the accenſion of the Blood.*

But here is need of great caution, leſt theſe kind of Cordials be ſo often indulged: For I have known many both men and women, by the often uſe of theſe to fall into this evil cuſtom, that they were neceſſitated oftentimes in a day to drink a draught of ſtrong Wine, Spirits, or of ſome ſtrong Waters. Moreover their Doſes (becauſe Nature being little accuſtomed to extraordinaries, doth not long endure their Contents) daily to increaſe, and often to repeat; ſo that at length the Stomach was not able to ſuffer or digeſt any moderate thing, ever expecting ſtronger and hotter things: But ſome *Viſceras* and eſpecially the Liver, are ſo dryed and roſted, that the Blood being waſted as to its proviſion, and depraved as to its *Craſis*, a morbiferous *Cacochymia* or ſhortning of Life follows thereupon.

The abuſe of theſe is deſcribed.

Many and various are the occaſions for which many people are brought into this moſt evil cuſtom of ſipping Cardiack Liquors: For beſides ſudden languiſhings ſtirred up perhaps, by great ſorrow, cruel labour, immenſe Sweats, or ſharp grief; moreover if at any time Aliments not agreeable, do bring a trouble or nauſeouſneſs to the Stomach, or by reaſon of a convulſive *Diatheſis*, a *Syncope* or inſenſibleneſs ſeems to threaten: Further, for many other cauſes it is a uſual thing to take vinous Spirits or *Aqua vitæ*, though very improperly ſo called, then after ſuch kind of Cordials being often taken, they begin to be agreeable and delightful, by every ſup of them the maſs of Blood being a little more enlarged and more inkindled, it cauſes the *Hypoſtaſis* of the whole Soul to be amplified and invited into a certain rejoycing; which afterwards ſinks down again, but the Soul mindful of that complacency and not content with its preſent condition, at length affects the ſame, and by and by looks earneſtly for the ſame to be taken again: Wherefore for every trouble of the Body or Mind, as ſoon as the Spirits begin a little to flag, a draught of Cordial Waters is ſought for to erect them preſently, and if it be ready at hand it is drunk, and ſo by reaſon of often ſtretching forth the Sails of the Soul to no purpoſe, the fabrick of the Body as of a Ship, periſhes and decays. Nor does this evil Cuſtom grow in uſe with Gluttons and great drinkers only, but ſometimes learned men and very fair and ingenious Women, by often ſipping Spirits and ſtrong Waters, whereby they might the better furniſh and exhilarate the quickneſs of their mind, ſpoyl and very often quite deſtroy their own health. There will be no need to add here any forms of theſe kind of Cardiacks, ſo well and commonly known, it ſeems enough to have here noted the abuſe of them.

Upon what occaſions this is wont to grow Cuſtomary.

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In the ſecond Claſs of Cardiacks we have placed thoſe which do ſomewhat allay the too great efferveſcency of the Blood, and do a little reſtrain and attemperate its immoderate burning; as diſtilled Waters, acid and nitrous things. *&c.*

2. What do allay the too great enkindling of the blood.

Take of the water of Wood-ſorrel, of whole Citrons, of Strawberries, of each ʒiiij, of the ſyrup of the Juice of Citrons ʒj, of the powder of Pearls ʒj, make a Julep, the Doſe is ʒij, three or four times in a day.

Julep.

Take of the water of Pippins or ſweet ſmelling Apples, of Rasberries, of each ʒvj, of the ſyrup of Violets ʒj, of the ſpirit of Vitriol *gut.* 12, make a Julep.

Take of Spring water ℔bjß, of the juice of Lemons ʒj, of Sugar ʒjß, make a Drink, of which take when you pleaſe ʒiij.

Apozem.

Take Graſs Roots ʒiij, of candied Eringoes ʒvj, two Apples ſliced (or of Corinthian Grapes ʒij,) the ſhavings of Ivory and Hartshorn each ʒij, of the leaves of Wood-ſorrel Mj, boyl them in ℔iij of Spring water to ℔ij, add to the ſtraining of *Sal Prunellæ* ʒiß, of ſyrup of Violets ʒiß, make an *Apozem*, the Doſe is ʒiij or iiij, thrice a day.

Take of the Conſerves of red Roſes Vitriolat. ʒiiij, Spring water ℔ij, diſſolve it in a cloſe thing and warm, then ſtrain it, the Doſe is ʒiij, at pleaſure.

Confection.

Take of Conſerve of *Oxyacant.* Rob of Rasberries, of each ʒiß, of prepared Pearl ʒß, Confection Hyacinth ʒj, of ſyrup of the Juice of Citron what will ſuffice, make a Confection, the Doſe is ʒß, thrice in a day.

3. Cardiacks opening the too ſtrict joynting of the blood whilſt that it ferments.

The third claſs of Cardiacks furniſhes theſe ſort of Medicines, which being deſtinated againſt the evils of the fermenting Blood do unlock and open its ſtrict joynting together, whereby its ſuperfluities may be ſeparated and ſent away. Theſe as they are chiefly and almoſt only Salines, for the multiplicity of Particles of which they conſiſt, they are alſo after a divers manner in the condition of Salts; as for the moſt part their *Baſis* is either Volatile or Alchaliſate, or acid, fixed or nitrous Salt. Some of whoſe forms we will here propoſe.

1. Of that kind whoſe Baſis *is a volatile Salt.*

Firſt Cardiacks indued with a volatile Salt are wont to be given profitably both in Fevers in reſpect of the Blood and alſo in ſwoonings and ſudden languors in reſpect of the animal Spirits, according to the following preſcriptions.

Spirits.

Take of the ſpirit of Hartshorn *gut.* 15 to 20, of Treacle water ʒij, let it be given in a ſpoon drinking after it a draught of an appropriate Liquor: after the ſame manner may be given the ſpirits of Blood, of mens Sculls, of Soot or the ſpirit of *Sal* Armoniack compounded.

Powders.

Take of the ſalt of Vipers ʒj, of Cryſtal Mineral ʒij of the powder of Claws compounded ʒiß, mingle it and make a powder, the Doſe is ʒiß to ϑij, in a ſpoonful of cordial Julep, drinking after it a little draught of the ſame.

Take of the flowers of *Sal* Armoniack ϑß, of Bezoartick Mineral ϑj, make a powder to be given in a ſpoonful of proper Liquor.

2. Whoſe Baſis *is an Alchale Salt.*

Secondly they are chiefly noted by the name of Cordials with the vulgar whoſe *Baſis* is an Alchaliſate Salt or petrifying: as in the firſt place Oriental *Bezoar*, Pearls, Corals, aud other ſtony and ſhelly Powders.

Take of Gaſcoins powder or of Claws compounded ϑj to ʒß, let it be given in a ſpoonful of cordial Julep, drinking after it of the ſame ʒij.

Take of Oriental *Bezoar gr.* vj to xx, let it be given after the ſame manner.

Take of the powder and of the Claws and Eyes of Crabs of each ʒj, of Pearls and Corals both prepared of each ϑiiij, both *Bezoars* of each ʒß, the beſt Bole Armeniack, Diaphoretick Gold each ϑij, Bezoartick mineral ʒj, mingle them and make a cardiack Powder, Doſe is ϑj to ϑij, or ʒj, in a fit Vehicle,

In Pleuriſies what are convenient.

Theſe following are eſteemed moſt proper in Pleuriſies, for as much as by deſtroying the powers of the acid Salt they take away or hinder the coagulations and extravaſations of the Blood.

Take of the pouder of a wild Bores Tooth ʒß to ʒj, cryſtal Mineral ϑj, of the pouder of the Flowers of Red Poppy ϑß: make a pouder to be taken in any Liquor. After the ſame manner is given the pouder of Crabs eyes, and of the jaws of the Pike fiſh.

3. Nitrous Cardiacks.

Hither belong alſo preparations of Nitre which according to the following Forms, hath been often given in Fevours with ſucceſs.

Take of Mineral Cryſtal ϑj, of the volatile Salt of Hartshorn *gr.* iij to vj, mingle them, make a Pouder, let it be given in a ſpoonful of Cordial Julep.

Take

Take of Mineral Cryſtal, of Diaphoretick Antimony of each ℈j, of Bezoartick Pouder ℈ß, let it be given after the ſame manner.

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4. Medicines whoſe *Baſis* is a fluid or acid Salt, for the unlocking the jointing of the Blood in Fevours, are preſcribed according to the following forms.

Cordials whoſe Baſis is an acid Salt.

Take of the ſpirit of Vitriol *gut.* iiij to vj, of Cordial Water ʒiiij, of Treacle water ʒij, of the ſyrup of the juice of Citrons ʒiij, of Pearls ℈ß, make a draught to be taken twice or thrice in a day. In the ſame manner may be taken the ſpirit of Salt of Nitre. For the ſame end the drink of Cherbet with Lemons diſſolved in Spring water, alſo the divine drink of the Palm tree are convenient.

Take of the pouder of Hartshorn calcined, or of Antimony Diaphoretick ʒiij, ſpirit of Vitriol or of Salt ʒj. let them be bruſed together in a glaſs Mortar and dryed, the Doſe is ℈j to ʒß, in a ſpoonful of Cordial Julep.

5. What abound in a fixed Salt.

The fixed Salts or lixivials of Herbs are often put into the compoſitions of *Alexipharmacons*. Beſides Medicines whoſe *Baſis* they are, for as much as they are noted, to be very famous *Febrifuges* or helpers in Fevours ought alſo to be numbred with Cardiacks.

Take of the ſalt of Wormwood ℈j, of *Carduus* water ʒiij, of the ſpirit of Vitriol or oyl of Sulphur ℈j, of the ſyrup of Violets ʒiij, make a draught to be taken two or three hours before the fit.

Take of the water of the whole Citron, of Wood-Sorrel each ℔ß, of the ſalt of Tartar ʒiß, of the juice of Lemons ʒij, of Sugar ʒß, mingle them, make a Julep, whoſe uſe is in irregular Fevours which have day by day ſharp fits without ſhaking. The Doſe is ʒiij, twice in a day.

Alexiterian Cordials which hinder the joynting of the blood being too looſe from putreſaction are either

The laſt Claſs of Cardiacks, and indeed in ſome reſpect the chiefeſt, is due to Alexiterians, for as much as they are chiefly vitals. The Kinds and Forms of theſe are ſo numerous, that if I ſhould recount every one or the chief of them only, this work would increaſe into a great volumn. And there are already of theſe ſort of Medicines, extant both many & great Antidotaries; therefore we ſhall be very ſparing concerning this matter. Seeing that Alexiterians are either Preſervatory or Curatory; we will in the firſt place ſhew you ſome ſelect Remedies to be adminiſtred to thoſe yet in health, againſt the contagion of every peſtilence or malignity, in the mean time letting alone what is wont to be preſcribed about the cure and alteration of the ambient Air; then in the ſecond place we ſhall give you the ſelect forms of preſcriptions to be uſed after the Contagion is taken.

1. *Preſervatory Antidotes.*

1. Preſervatories.

Electuary.

Take of the Conſerves of the leaves of Rue ʒiiij, of Mithridate and *Confect. Liberantis* of each ʒj, *Confect. de Hyacinth.* ʒij, of the ſalt of Wormwood ʒijß, of the pouder of red Cloath ʒß, Bezoartick Vinegar what will ſuffice to make an Elect. the Doſe the quantity of a Cheſtnut thrice a day.

Powder.

Take of the Virginian Serpentary roots, of the roots of *Contrayerva*, and of Zedoary picked, of *Species Liberantis* of each ʒij, of Camphir ℈ij, of Sugar diſſolved in Bezoartick Vinegar and boyled to a conſiſtency ʒvj, make thereof according to Art Tablets weighing ʒß, to be eaten one or two often in a day.

Apozem.

Take of the Roots of Virginian Serpentary ʒiij, boyl them in Spring water ℔iij half away, to the ſtraining add of the beſt Hony ʒij, of Treacle *Andromach.* ʒj, diſſolve it cloſe and hot, and ſtrain it, the Doſe is ij or iij ſpoonful three or four times a day.

Elixirs.

Take of the Flowers of Sulphur ʒiiij, melt them in a Crucible, then put in by ſpoonfuls one after another, of the ſalt of Wormwood ʒiiij, mixing it together till the whole Maſs grows red; then add to it the powder of Aloes, Mirrh, and *Olibanum*, of each ʒj, of Saffron ʒß, work them together for above a quarter of an hour until they be incorporated, the Maſs being cooled and put on a glaſs Plate let it melt into a moſt fair Oyl like a Ruby to ſee to. The Doſe is *gut.* 10 to 20 in Bezoartick water, ʒiß or ij, twice in a day.

Or put the ſpirit of Wine rectified upon the roots of Serpentary Virgin. and *Contrayerva* to the aforeſaid Powder, to the height of three fingers breadth, let there be drawn forth a Tincture whoſe Doſe is *gut.* 20 to 30 in a fit Vehicle.

Or take of the ſame powder ʒß, put to it of generous Wine ℔ij, diſſolve it

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2. Curatory.

cloſe ſhut and warm, the Doſe is on ſpoonful twice or thrice in a day.

After the Contagion is taken, and the *Craſis* of the Blood vitiated and beginning to be corrupted, the ſame ſorts of Remedies but a greater doſe and oftner are convenient to be given, yea both acetous things, and the fixed ſalts of herbs are very often added with ſucceſs to *Alexipharmacaes*; by which the Coagulations of the blood are diſſolved, and then all the heterogeneous Particles whatſoever being evaporated, and the others being conſtrained into a due mixture, its Liquor at length recovers and retains its ancient ſtate and condition. For theſe end as there are extant every where innumerable forms of remedies in phyſical Books, I think fit only to ſet down here one or two.

Curatory Antidotes.

A Drink. Take of Bezoartick water ℥ijſß, of Bezoartick Vinegar ℥ß, of Treacle *Andromach.* ℈j, mingle them by ſhaking them in a glaſs, make a draught, to be taken for provoking ſweat.

Powders. Take of Gaſcoins powder, of the powder of *Contrayerva*, Virginian Serpentary, of each ℈j to *gr.* 25, make a powder, let it be given in a ſpoonful of Treacle water drinking after it a draught of the ſame or of a Cordial Julep.

Take of the powder of Tods prepared, of the powder of Claws compounded each ℈ß, make a powder, give it after the ſame manner.

Bole. Take of Bezoartick *Mineralis* ℈ß, Treacle *Androm.* ℈j, of Camphir *gr.* vj, Bezoartick Vinegar what ſuffices, make a *Bolus* to be taken after the ſame manner.

Julap. Take of the water of Angelica, *Carduus*, of Dragons each ℥iiij, of *Scordium* Compound ℥ij of Bezorat. of Treacle each ℥j, of the powder of Pearls ℈j, of the ſyrup of Clove-gilliflowers (or of the Juice of Citrons) ℥ij, of the ſpirit of Vitriol *gut.* 12, make a Julep, the Doſe ℥iij, often in a day; ſometimes by it ſelf, ſometimes with other Medicines.

Chap. III.

Of Cardiack Paſſions and their Remedies:

Cardiack Paſſions are wont to be ſo called. After the Cardiack Medicines ſo called, though improperly, follows to be handled the cardiack Paſſion, in which indeed the Heart labours and therefore truly requires cordial Remedies. Under this true name are commonly noted two Affections ſomewhat divers in themſelves; to wit, the trembling of the Heart and its Palpitation: in either of which Affections the motion or inordinate pulſe of the Heart ſeems to be in a manner convulſive: but yet the inordination of the former conſiſts in the frequency of its Vibrations, and of the other in their vehemency. We will firſt ſearch into the Reaſon of this latter, and then we will endeavour alſo to ſhew the knowledge of the other, and laſtly the cure of them both.

The trembling and the beating of the Heart.

The deſcription of the latter. The Palpitation of the Heart is ſometimes ſo vehement and great, as not only manifeſtly to be perceived by touch, but alſo to be beheld by the eyes, yea ſometimes may be heard at a certain diſtance. Moreover it hath been related by credible Authors, that by the more vehement vibration of the Heart and percuſſion of the Ribs they have ſometimes been broken or in younger people driven forth and continued protuberous or ſticking out.

The Reaſon of it ſearched into. But truly although this motion may be perceived by ſo many of the ſenſes, yet it does not appear to reaſon what part is ſo moved, that it ſhould make the left ſide of the Breaſt to leap out by every one of its ſtrokes. I do believe that all both the

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the learned and unskilful, will ſay with one conſent that the part ſo moved and ſtrongly ſhaken is the Heart it ſelf; but I ask whether it be the whole frame of the Heart, or any part of it, that ſo leaps forth, and tranſgreſſes the wonted Sphear of its vibration? If it be ſaid it is its whole Body that is ſo carried forth, I would have them ſay whether this is made in its *Syſtole* or *Diaſtole*: Certainly not the firſt, for whilſt the heart is contracted, as may appear by inſpection, its bigneſs as to all its parts is leſſned; no more can it be ſaid in *Diaſtole*, becauſe in that ſtate the Heart returns only to its ordinary and natural ſite and magnitude, and remains a little time in it. Hence ſeeing that according to the Laws of its vibration how ſtrong or increaſed ſoever, the Heart cannot ſo palpitate, and leap forth; (which alſo further appears, becauſe in a fevouriſh Fit when it beats moſt vehemently, it does not leap forth and ſtrike the ſides) I was once ſuſpicious that during that affection it did obtain a convulſive motion, and quite contrary to its ordinary motion; whereby being agitated like a convulſive Member, the Heart was wholly elevated and moved forth of its place. But the Neurology being more fully underſtood I preſently fell from this opinion, becauſe it is certain that the Heart can no ways be lifted up or carried forth, by any other Muſcle, beſides it own moving Fibres. Wherefore conſidering this thing more ſeriouſly, it at length came into my mind that whilſt the Heart is contracted, for the excluding the Blood from its confines and that its tops and ſidesyeild on every ſide and are brought nearer; if notwithſtanding all the blood be not forthwith wholly caſt forth and ſent away at every *Syſtole*, there will be a neceſſity for the roots of the Veſſels filled to the hight and very much extended to leap forth with a certain force, then by reaſon of the verberation here made, the whole frame of the Heart to be greatly ſhaken.

It proceeds not from the Convulſive motion of the Heart it ſelf.

Truly that this Affection doth ariſe from ſome ſuch cauſe ſometimes I have ſeen confirmed of late by an anatomical obſervation. A godly and known divine after that he had lived obnoxious to the palpitation of the Heart, at very many times now of its own accord now occaſionally, he began at length to be afflicted with it continually night and day, with a grievous purſineſs, and then within a few months being worn out with the aſſiduity of this moſt troubleſome Diſeaſe, he dyed. His dead Body being opened, the right corner of his Heart appeared tumid with concreted blood, a little lap of which being hugely increaſed and extended contained great plenty of clotted blood. The Reaſon of theſe contents did preſently appear, *viz.* becauſe the Lungs being hugely obſtructed and ſtuffed with black extravaſated gore ſtagnating every where, were not able to admit of the blood continually to be thruſt forth from the Ventricle: wherefore whilſt the Heart highly labouring for its total excluſion is contracted inward towards the middle by every *Syſtole*, and as to its magnitude is diminiſhed; its *Baſis* by reaſon of the blood there heaped up and ſticking or reverberating in its paſſage, being very much filled bunches forth, and becauſe of the greatneſs of the Lap, or little Ear; being more tumid, ſhakes more largely and reaches to the ſide.

It ſometimes proceeds from the efflux of the Blood into the Arteries being hindred.

But indeed the Heart is ſeen to beat not only from this cauſe; becauſe this Diſeaſe is not always conſtant and perpetual, but for the moſt being wandring, and uncertain infeſts at certain times, and then of its own accord or by the uſe of Remedies ceaſes. Beſides it has hapned to ſome frequently whoſe Lungs are whole enough and free from any infection.

Beſides it is wont to ariſe from other cauſes.

However although this Diſeaſe may ariſe from divers cauſes, yet we judge the ſame means of affecting to be even in them all. For it ſeems that the Heart only palpitates, for as much as whilſt the Cone and ſides being contracted together, it is ſtraitned in its *Syſtole*, the *Baſis* with the Roots of the Veſſels being enlarged by reaſon of the blood there heaped up and ſometimes adhering or repercuſſed, ſwells out or is tumefied. In truth from hence it appears that the courſe of the Blood in this place is ſomewhat hiudred or beaten back, becauſe whilſt the Heart is vehemently and ſtrongly ſhaken in the ſide, the Artery in the wriſt for the moſt part beats languidly and weakly, as it were containing but a ſmall River of Blood. Therefore as the conjunct cauſe or formal reaſon of this Diſeaſe, conſiſts altogether in the ſtopping and aggeſtion of the Blood about the *Baſis* of the Heart and Roots of the Veſſels, it follows that we muſt inquire after how many ways and for what other cauſes this kind of affection is wont to be produced.

This affection for the moſt part depends upon the vitiouſneſs of the Blood or of the Veſſels belonging to the Heart.

Concerning theſe as we do not lay the fault much on the Fleſh or the proper moving Fibres of the Heart, this Evil chiefly ſeems to be imputed either to the Blood

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Blood or to the Veſſels hanging to the Heart. The reaſon of the firſt is plain enough, for as much as thoſe indued with a watry Blood or leſs apt to an effervescency or enkindling, as Virgins labouring with the green Sickneſs or chachectical men or women, are found for the moſt part obnoxious to this Diſeaſe, and are wont to be troubled with its aſſault conſtantly upon every the leaſt quick motion of the Body. The cauſe of which is, for that the Blood conſiſting of ſluggiſh and not active enough Particles, is not caſt forth freely and expeditiouſly from the Boſoms of the Heart, but part of it oftentimes remains in them and eaſily ſtagnates: therefore as often as by the motion of the Body more plenty isbrought into them that its whole proviſion cannot be caſt forth by every *Syſtole*, the Heart labouring with mighty ſtrugling drives it forth ſcarce beyond its *Baſis* and the roots of the Veſſels; where when it is heaped together,and remaining a little while, makes the parts containing it to bunch out, it cauſes the cardiack Paſſion together with a *Dyſpnœa* or ſhortneſs of Breath.

The reaſon of the former explained.

2. *In the other caſe either the Veſſels are obſtructed or they are affected with a Convulſion.*

Beſides this cardiack affection does oftentimes infeſt ſome, notwithſtanding they are indued with a very hot Blood and apt to be readily enough inkindled or to ferment. This evil is frequent and familiar with very many much troubled with the Hypochondriack, Hyſterick, or otherwiſe convulſive Paſſion: wherefore in theſe caſes we have deſervedly ſuſpected the Arteries belonging to the Heart to have been in the fault. By what means their obſtruction hindring the free efflux of the Blood from the heart, cauſes the palpitation of the Heart, the Hiſtory now recited manifeſtly declares: beſides the ſhutting up of thoſe Veſſels,and infarſions or ſtuffings up being by other ways excited may produce the ſame effect. I knew an old Man accuſtomed for many years to the often drinking of ſtale ſtrong Beer, and alſo of Wine, was wont to ſuffer frequent aſſaults of the aforeſaid Diſeaſe; who dying afterwards with an ulcerous inflammation of the Stomach, with daily vomiting, with languor of Spirit, and other Symtoms; when I opened his dead body, I found the Trunk of the great Artery aſſoon as it was gone from the Heart to be bony or rather ſtony and its ſides to be greatly compreſſed, that a chink only being left, not half the torrent of the Blood could flow that ſhould do. So that I might very well aſcribe the cardiack Paſſion ſo very troubleſome to him to this cauſe. But it is probable this Affection does ſometimes proceed from the Blood clotting within the Boſom of the Heart, and the adjoyning Veſſels, and being concreted as it were into a fleſhy Cruſt.

An example of the former is propoſed.

And diverſe kinds noted.

How the palpitation of the Heart is a convulſive Affection.

But beſides theſe, for as much as the cardiack Palpitation is wont oftentimes to be accompanied (as we but now intimated) with other convulſive Affections, we may ſuſpect alſo that its cauſe is ſometimes meerly convulſive. We have formerly ſhewed out of anatomical obſervations in our Neurologie, the Nerves, and nervous Branches almoſt innumerable in very many places and cheifly neer the *Baſis* of the Heart to be folded and wound about the Trunks of the Arteries; the Uſe and Actions of which we think to be of this Nature that the divers manner of Heats, Fluxes and Refluxes, yea ſometimes Stagnations of the Blood that are wont to be excited by reaſon of the vehement affections of Anger,Fear,Joy,Sorrow, and ſuch like, may ſo come to them, for as much as theſe little nervous Strings do variouſly ſtrain, preſs together, or perhaps ſometimes wholly ſhut up theſe ſanguiferous Veſſels. Beſides it is not very improbable that by reaſon of thoſe Veſſels being convulſively affected, and a little longer conſtrained, ſo that they hinder the free exilition of the Blood from the Heart, the aſſaults of the cardiack Palpitation may ariſe. Indeed we may very well impute both this, and thoſe other paſſions of the Heart to ſuch a cauſe; but as to the means of doing it we a little ſeem to differ from that opinion. For after I had weighed more exactly the uſe and actions of the Nerves. I underſtood at length that they or their ſhoots did not draw or conſtrain any thing at all, but that all this buſineſs was performed wholly by the fleſhy Fibres, and that the nerves only do convey to theſe moving parts, new and abundance of Spirits, and alſo the inſtincts of approaching motions: which like kind of Office they performs towards the membraneous Fibres for the buſineſs of Senſation.

For what uſe the many nerves are inſerted into the Coats of the Arteries

The Arteries being indued with moving Fibres.

Therefore whilſt I did ſeriouſly ſearch for what uſes ſo many Nerves ſowed thorow the Coats of the Veſſels did ſerve, at length I found theſe Arteries by their own ſtrength to contract and dilate themſelves even like other *Præcordia*,and for the performing their motions both naturally and pathetically, both the plenty of Spi-

rits,

rits, and the means of Inſtincts to be carried through thoſe Nerves. For by anatomical obſervation it plainly appears that the middle Coat of every Arterie, is clearly muſcularie, and through the whole conſiſts of fleſhy Fibres as thoſe of the Ventricle, the Inteſtines, and ſome other *Viſceras*, which ringy Fibres compaſſing about with a thick *Series*, as it were of ſmall Hairs, the Pipe or Tube of the Arterie, do atchieve without doubt their proper *Syſtoles* and *Diaſtoles*, even as the Heart it ſelf. Wherefore in the firſt place, whilſt the Cardiack Fibres and then theſe Arterious, are ſucceſſively, and one *Series* after another contracted, there is a neceſſity that the Blood ſhould be rapidly driven along, from one bound to another. Wherefore it is not for nothing that ſome Phyſitians have attributed alſo a pulſifick Facultie to the Arteries: for that it is very improbable that the circuit of the Blood is performed by the impulſe of the Heart as it were the ſtroke of a Bar. It is more likely by much that the Arterie in its whole paſſage being contracted as it were at the back of every ſanguineous Flood, ſhould urge it every where thorow thoſe little ſmaller rivulets and more narrow ſpaces. According to this ordinary rite in equally driving about the Blood, the Arteries ſeem to have their conſtant turns of *Syſtoles* and *Diaſtoles*. Which although they are very ſwift, more quick than the twinkle of an Eye, yet they are made ſucceſſively thorow all the parts of the Arterious Tube. But as we have noted that the equal courſe of the Blood is diverſly broken off, and diſturbed according to the force of aſſaults of the Paſſions, there will be a neceſſity that it is only ſo done for as much as the Arteries (by reaſon of an Inſtinct given through the Nerves to the moving Fibres) being ſuddenly conſtrained in divers places, they either ſtop, or repreſs, or drive to and fro more impetuouſly, the ſanguineous Flood. In Fear, ſudden Sorrow, Shame, Love and other Affections bringing in a conſternation or great confuſion of Mind, it is probable that the Trunk of the *Aorta* is ſo contracted and ſtraitned by theſe Fibres ſuddenly and for ſome time drawn together, that the Blood very hardly and not but by very little Portions drops forth from the Boſome of the Heart. Wherefore from it there heaped up and ſtagnating, there is preſently felt a mighty burthen, and a great oppreſſion: then if to this ſtop of the Blood, a ſtrong and vehement pulſation of the Heart for the caſting forth of the Blood follows, it will be neceſſary by reaſon that the Blood being ejected at every *Syſtole* to the *Baſis* of the Heart, and there repercuſſed, for thoſe parts to be very much diſtended, and for that reaſon the cardiack Palpitation to be produced.

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Is moved like other Muſcles and the Heart it ſelf.

And is often affected with a Convulſion or Cramp.

From whence the palpitation of the Heart often ariſes.

But as vehement Paſſions of the Mind do bring this affection almoſt upon every one, ſo Hypochondriacal Perſons, and ſuch as are convulſively diſpoſed are ſubject to its aſſaults upon every light occaſion, yea ſometimes without any manifeſt cauſe. But in ſome the Splanchnick and Cardiack Nerves are wont often to be beſet with a morbifick matter; ſo that it being moved by reaſon of plenitude or irritation, compells the Spirits inhabiting thoſe parts, and neer about, frequently into Convulſions and inordinate Contractions; it ſtill happens becauſe that the Nerves being inſerted in the Roots of the Cardiack Arteries from ſuch a cauſe affected, alſo the Fibres of theſe Veſſels being convulſively affected, and contracted therewith, by which means it is ſaid to ſtir up the cardiack Palpitation. By what means the cardiack Nerves are irritated from a neer or remote cauſe, by a morbifick matter ſubſiſting either in the Head neer to the Nervous beginning, or about the *Præcordia* or *Hypocondria*, and are carried into Convulſions or Cramps of divers Kinds, we have ſhown in ſome other place, from whence the cauſes of the Cardiack Palpitation may be deduced as often as the ſame ſhall be alſo Convulſive.

Wherefore this affection is familiar to Hypochondriacal perſons.

As to what belongs to the cure of this Diſeaſe, as the cauſes of it are various and manifold, a divers way of Cure alſo ought to be ſhown. For what ſome affirm that theſe Remedies commonly called Cordials do refreſh the Heart, and are believed to bring help to it being ſick, in ſome caſes it is contrary both to reaſon and common experience to give them. Therefore as we have above declared that the palpitation of the Heart proceeds from the fault of the Blood or of the Arteries hanging to the Heart, and hinted the various means of either of theſe being affected, it now remains that we accommodate an apt method of Curing of every kind of this Diſeaſe, together with ſelect Forms of Remedies.

Its Cure is propoſed.

1. In the firſt place therefore as often as this Diſeaſe proceeds from the default of

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of the Blood, the primarie Therapeutick Intention will be to exalt to a better *Crasis* the too watery Blood being unable to be enkindled and to ferment, and to lift up and increase its active Principles being depressed or diminished; to which end spirituous Medicines, also salines of every kind, sulphureous and chiefly Chalybeate Medicines conduce, yea hither may be referred what are wont to be prescribed in the *Pica* or longing Disease, the Leucophlegmacie or Phlegmatick Dropsie and the colder Scorbute.

What it ought to be as often as the fault is in the Blood.

Electuary.

Take of the Conserves of the yellow Pontic Wormwood, of Orenges and Limons, of each ℥ij, of the Pouder of Winteran Bark ℥ij, of the *Species* of *Diacurcuma* ℥j. of Steel prepared with Sulphur ℥iij, of the Salt of Wormwood ℥jß, with what will suffice of the Syrop of the Rind of Citrons, make an Electuary. The Dose the quantity of a Nutmeg in the Morning and five a Clock in the after-noon, drinking after it of the following Julep ℥iij, and walking upon it.

Julep.

Take of the water of the Leaves of Aristoloch, or Birthwort ℔j, of Penyroyal, of Hisop, of each ℥iiij, of the Water of Earthworms, of Snales, and *Aq. Mirabilis* of each ℥j, of Sugar ℥j: mingle them and make a Julep.

Tincture.

Take of the Tincture of Antimony ℥j. The Dose is *gut.* 20 to 25 twice in a Day with the same Julep. Moreover hither may be ranked the Tincture of Steel, or the Syrop of the same, also the *Elixir proprietatis* with many others.

How this Affection ought to be handled proceeding from the Arteries being obstructed.

In the second place the Palpitation of the Heart, both oftner and much more crueller arises from the Cardiack Arteries being in fault: and then their Fault is either an obstruction or a Spasmodick Affection.

This first Disease is for the most part continual, and is often incurable; but especially if it be excited from tabid Lungs, or the Roots of the Arteries being compressed, or half filled by reason of some bony Tubercle or excrescency. which sort of cause if at any time they appear, and may be perfectly known, it were in vain to endeavour their taking away; but rather that it is only to bed one, that the life of the sick though miserable may be a little longer prolonged by some ease being procured by means of Hypnoticks.

But indeed it is not improbable (as we hinted but now) that the Arteries, sometimes from Polypous Concretions that are wont to be begotten there and sometimes within the Bosom of the Heart, are in a great part filled up; and for that cause the free and whole exilition of the Blood is hindred. But as we suppose the *Diagnosis* or thorow Knowledge of this very difficult, so likewise the Cure not less rare. When there is suspition of it, Saline Medicines seem to be of the greatest use; and of those, they that are indued with a Volatile or an Acid Salt are to be given: but not together, but those for some space (which not helping) then it will he necessary to try the others.

Medicines indued with a volatile Salt.

Take of the Spirit of *Sal* Armoniack Compound, *viz.* with *Millepedes* or with other Antasthmaticks or things good against the stoppings of the Lungs distilled ℥iij, the Dose is 15 Drops to 20, thrice in a Day with a Julep or proper distilled Water. After the same manner may be tryed the Spirits of Harts Horn, Soot, Blood or of mens Skulls.

Such as have an acid Salt for their Ground.

Take of the Spirit of Sea Salt, or of Vitriol distilled with the Spirits of Wine impregnated with Pneumonick Herbs, and often Cohobated ℥iij, Dose *gut.* 15. to 20 after the same manner. For this use the Spirit of Tartar of the Woods *Guaicum* or Box.

The Cure of the Disease arisen from the Arteries convulsively affected.

3. The Palpitation of the Heart is most often a convulsive Affection, and is wont to be produced from the like cause and means of affecting as other Hypochondriack or asthmatick affections. Whose Cure also ought to be endeavoured it like manner by antispasmodic Remedies or things good against Cramps or Convulsions. But the Choice of which is made with a certain difference, according as the Disease appears to be either of a Hot or Cold Temperament.

Spirits.

1. In respect of the former these following are prescribed. Take of the Spirits, Amber, Armoniack ℥iij, the Dose is *gut.* 15 to 20, twice in a Day with a Julep or proper distilled Water. After the same manner may be given at times the Tincture of Tartar, Steel, or Antimony.

Of the Trembling of the Heart. Part I.

The Trembling of the Heart (which alſo commonly goes under the name of a Cardiack paſſion) is an affection diſtinct, yea divers from its Palpitation. For in it its own fleſhy or moving Fibres ſeem to be affected by themſelves, and not to ſubſiſt as in the other Affections, in a morbifick cauſe in the Blood or in the Cardiack Arteries. *How the trembling of the Heart differs from its palpitation.*

The Trembling of the Heart may be well deſcribed, that it is a Spaſmodick Convulſion or rather a trepidation of its Fleſh: by which the moving Fibres do moſt ſwiftly effect, but yet being but half contracted, quick, but broken and as it were but half turnes of *Syſtoles* and *Diaſtoles*; ſo that the Blood can both be brought into, and alſo carried out of the Boſoms of the Heart, but only by very little Portions. *Its deſcription.*

Becauſe that this Affection may be a convulſive motion of ſome Muſcle, *viz.* of the Heart, to the more full Knowledge of it, what we have diſcourſed in another place concerning the Muſculary Motion, and alſo concerning Convulſive Affections ought to be referred hither. That I may not ſeem tedious by repeating many things, in a Word know that every Muſcle conſiſts of two Tendons and a fleſhly Belly; and that Contraction is from thence performed for as much as the Animal Spirits leap forth from either of the Tendinous Fibres into the fleſhy, which whilſt they blow up and intumifie, they therefore make ſhort and render contractive; but the motion being ended, the Spirits return into the Tendons, and the fleſhy Fibres are relaxed. *The reaſon of this depends upon the Doctrine of Myologie or knowledge of the Muſcles.* *The ſum of which is delivered.*

As the Motive Function is double, to wit, ſpontaneous and merely natural, in the former we ſay the Spirits are called forth by the government of the Appetite from the Tendons into the fleſhy Fibres, and do remain within them in action till they are diſmiſſed by its beck, but then being returned they remain quiet in the Tendons until they are again commanded forth, hence it is that their motion, and times of reſt are unequal, uncertain, and variouſly to be determinated at our pleaſure.

In the Function meerly natural it is much otherwiſe; for that the Animal Spirits are carried forth from the Tendons into the Fleſh by a perpetual turn or conſtant reciprocation, and a ſhort contraction being made they preſently leap back from theſe into thoſe, and ſo viciſſively; after which manner the Heart it ſelf, the Arteries, and Organs of reſpiration, yea the fleſhy Fibres of the Ventricle and Inteſtines, unleſs they are otherwiſe determinated by reaſon of their objects, are agitated by perpetual *Syſtoles* and *Diaſtoles*.

According to theſe ordinary means, the offices of the motive Function of either are performed, notwithſtanding which they are wont to be diverſly perverted or diſturbed according as the Animal Spirits the performers of thoſe motions are variouſly affected. For indeed it appears plain enough that the Inſtinct of every contractive motion coming from every muſcle is conveyed by the Nerves from the Brain or the Cerebel or little Brain (in the hinder part of the Head) according to the command of the Appetite or the indigency of Nature; *viz.* The Animal Spirits abounding within their Pipes, being ſtirred up according to an Impreſſion delivered from the Head, and moved in the whole *Series*, preſently awaken others inhabiting the Tendons, and provoke them into proportionate motions, almoſt after the ſame manner as if any one ſhould ſet fire of a Train of Gunpouder at a diſtance with a lighted Match. Therefore ſo long as thoſe Spirits implanted both in the beginning, *viz.* Within the ἐνκέφαλον, and in the way, *viz.* the nervous Pipes, and in the end, *viz.* within the Tendons do keep rightly and orderly, they form, thoſe convey, and theſe at length execute the inſtinct of every motion required by the Soul or Nature: but if the Spirits deſtinated to the motive Function being unnaturally affected within any Dominion are compelled into irregularities, for that reaſon preſently convulſive motions are excited in the members or reſpective muſcles. By what means by reaſon of a morbifick cauſe nigh the nervous Origin in the Head, by what alſo, by reaſon of that planted elſewhere within the nervous Pipes convulſive affections either of the members, or *Viſcera* or *Præcordia* are wont to ariſe, we have in another *The convulſive motions of the Muſcles are explicated.* *And diſtinguiſhed.*

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nother place largely enough declared; *viz.* for that the Spirits flowing within the Nerves being irritated, and ſtruck as it were with a certain fury from ſome preternatural cauſe, whilſt they ruſh into theſe or thoſe parts, and carry falſe and unjuſt ſigns of motions to be ſtirred up, there will be a neceſſity for contractions or violent and convulſive diſtentions in theſe or thoſe Muſcles, or Membranes to be cauſed, we have clearly ſhown the various kinds and formal reaſons of theſe ſort of affections in our *Spaſmologie*; but what was there pretermitted, and belongs to the matter in hand we will now further advert, that we grant there are other kinds of Spaſms or Cramps which do ariſe without any preſent or great fault of the ἐγκέφαλον or of the Nerves, by reaſon of the animal Spirits inhabiting the Tendons themſelves being chiefly and almoſt only in the fault.

Some private convulſions belonging only to the Muſcles.

We meet with two obſervable kinds of this ſort of ſingular and as it were private Affection: one is commonly enough known in which the ſpirits unbidden do often leap forth from the Tendons, and greatly and grievouſly blowing up the fleſhy Fibres, do not preſently or eaſily recede. The other, although leſs known, yet frequently happens in which the muſculary Spirits are able to remain long, neither within the Tendons, nor within the fleſh, but being highly unquiet, make out of theſe into this and back again in ſpight of Appetite or nature, their very often courſes and recourſes, but even weak and inordinate. Concerning theſe convulſive Affections (becauſe they remain as yet untouched by moſt Phyſicians, and the knowledge of them makes very much for the truly unfolding the cauſes, and the nature of the cardiack Paſſion) I think it worth my labour here, although beyond the matter propoſed, and as it were for Diverſion however to ſet down a few things.

Two kinds of them ſet down.

The former commonly called the Cramp explained.

This former Affection which is properly τέτανος (and both in our *Idiom* and the French is wont to be called the Cramp) for the moſt part ariſes, for that the animal Spirits unbidden do of their own accord leap forth from the Tendons from one or both together into the Belly of the Muſcle, from whence they will not go back preſently after their wonted manner, but ſtaying longer within the fleſhy parts do greatly inflate them, and render them highly contracted; then becauſe others neither give place to theſe Muſcles, nor conſpire in Contraction, the part becomes ſtill and ſtretched with exceeding great pain. The cauſe of this is, a certain Heterogeneous matter, and inflating, which deſcending thorow the nervous Pipes together with their Juice into the Muſcles, and ſticking to the Spirits, renders them Elaſtick and alſo obſtinate; becauſe that they cannot be contained within the tendinous Fibres, but deſiring larger ſpace they run forth into the fleſhy parts, and there remain till their Tumour abates.

The latter is a leaping or trepidation of ſome Muſcle.

Of which ſort of Affection is the trembling of the Heart.

2. To this latter kind of convulſive motion properly belongs the Paſſion, or trembling of the Heart. Further to this Cenſe ought to be referred an affection commonly enough known and familiar to many, to wit, that ſometimes they ſuffer a leaping, or very frequent and equal trepidations of ſome private Muſcle: to wit, in the Lips, Cheeks, Eyes, or other Members; which after they have indured two or three minutes perhaps ceaſe of their own accord. Not long ſince I was adviſed with by Letters from *France* concerning a certain Gentleman, all whoſe Muſcles thorow his whole Body, did almoſt perpetually uſe ſuch kind of leapings or trepidations, ſo that his outward Fleſh every where leaping forth, imitated exactly the Vibrations of Pulſes of the Heart it ſelf.

Its formal reaſon.

The formal Reaſon of theſe kind of Affections, and as of the Cardiack trembling ſeems to conſiſt in this, for that the animal Spirits belonging to ſome Muſcles being unquiet, and as it were ſtruck with a ſudden fury, continually leap forth from the Tendons into the Fleſh, and return, and iterate by a perpetual change their excurſions and recurſions; in the mean time as they are carried forth only with very ſmall forces that they hardly fill the fleſhy Fibres, and continue in them but a very little ſpace only, although the motive endeavours be very often, yet they are but very weak and ſmall; in ſo much as the Members, and Joynts are not moved out of their place by the ſo perpetually agitated Muſcles, and the Heart during its tremor, how ſwiftly ſoever it be ſhaken, ſcarcely or not at all is able to drive about the Blood; as it plainly appears by the ſmall and as it were trembling Pulſe and failing of all ſtrength.

The Cauſes.

As to what belongs to the cauſe of theſe Affections, *viz.* the conjunct, and more remote, by which the muſculary Spirits are made ſo unſtable, or acquire

that

that desultorie force; it seems to be for that a certain Heterogeneous matter, and elastick coming from the Brain and nervous Passages, is carried at length into the Muscles and their tendinous ends; where growing with the Spirits from thence do greatly irritate them, and affect them as it were with a certain fury, so that they can stand still no where, but run about hither and thither, and in the mean time omit their due tasks, or not strenuously perform them. Part I.

Not rightly imputed to the Spleen.

The cause of the Cardiack Trembling is commonly cast upon the Spleen; for it is vulgarly supposed that from this *Viscus*, being obstructed or being otherways amiss, foul vapours are elevated to the Heart; which striking it compel it to be so shaken and to tremble, yea affect it with a certain rigor.

Faith to this opinion is confirmed or at least its probability, because Hypocondriack Persons (or what is almost the same, splenical) are found to be very obnoxious to this Cardiack passion. What and how much influence the Spleen has on the *præcordia*, we have already largely declared: From that and partly from what was but now said, it appears plain enough that this opinion, though much received, of the Heart being affected by vapours, is altogether false and erroneous. But that those who are esteemed splenetick and hysterick commonly, are still infected with the trembling of the Heart, The cause is, that great affinity and intimate communication, which the splanchnick Nerves have with the Cardiack, so that not only the affection of one part easily draws the other into consent, but if at any time a spasmodick matter falls upon the Branches of the Nerves, belonging to the Spleen or the *Viscera* of the lower Belly, it is very rare but that it possesses in like manner the Nerves belonging to the *Præcordia*.

The Heart not affected by vapours.

Its Cure.

What belongs to the reason of the Cure, to be shown in the trembling of the Heart; for that this Affection is merely Convulsive therefore not Cardiack, but rather cephalick Remedies, or for the Nerves, are prescribed; which notwithstanding ought to be according to the Temperament and Constitution of the Patient, and more hot or moderate, or now of this now of that nature. That I may comprehend the business in a few words, as in that Disease three kinds of Remedies are wont to be chiefly profitable, *viz.* testaceous or shelly, Chalybiats and such as are endued with a volatil Salt, we will here shew briefly some forms, and the use of every one of them. Therefore in the first place a provision being made by emptying of all, and a choice being had of the evacuation which might seem most useful, you may prescribe according to the following modes.

Powders.

Take of prepared Coral, of Pearls, each ʒij, of both *Bezoars*, of each ʒß, of the whitest Amber ϑij, of Amber Grise ϑj, make a Powder: The Dose is ʒß twice or thrice in a day, with some appropriate distilled water or Julep.

Take of the powder of Claws compounded ʒij, of the powder of the Roots of Male Peony, of a humane skull prepared, of each ʒj, of the Flowers of Male Peony, of the Lillies of the Vallies, of each ʒß: Make a Powder to be taken after the same manner.

Tablets.

Take of Ivory, red Coral powdered, each iij, of the *species* of *Diambræ* or confection of Amber ʒj, of the whitest Sugar dissolved in what will suffice of water of *Naphæ*, and boyled to a consistency ʒvij: Make according to Art Tablets weighing ʒß, eat one or two often in a day at your pleasure.

Electuary.

Take of the Conserves of the Lilly of the Vally ʒvj, of the powder of Coral prepared, of Pearls, Ivory, Crabs eyes, of each ʒjß, of Vitriol of Steel ʒj, what will suffice of the Syrup of Coral, make an Electuary. The Dose ʒj to ʒij twice in a day, drinking after it a draught of the following Julap.

Julep.

Take of the waters of Betony, Peony, of the whole Citron, each ʒvj, of the rinds of Oranges distilled with Wine ʒij, of Sugar ʒj, make a Julep.

Syrup.

Take of our Syrup of Steel ʒvj, the Dose one spoonful in the morning, and at five a Clock in the Afternoon: With ʒij of the before prescribed Julep without Sugar or with distilled water.

Tablets.

Take of the powder of Ivory, Coral, each ʒijß, of the *species* of *Diambræ* ʒj, of the salt of Steel ʒij, of Sugar ʒviij, of Amber Grise dissolved ϑß: Make Tablets weighing ʒß, Dose ʒiij or iiij twice a day.

Distilled Waters.

Take of fresh Strawberries ℔viij, of the outward peels of twelve Oranges, the filings of new Iron ℔ß, being all bruised together put them to Whitewine ℔viij,

Part I.

Spirits.

let them ferment in a cloſe Pot for twenty four hours, then ſtill it in an ordinary ſtill.

Take of the ſpirit of Harts Horn, or of Blood or the like ʒiij, the Doſe is twenty drops in ſome convenient Vehicle twice a day.

powders.

Take of the flowers of *Sal* Armoniack, of Coral prepared, each ʒij, the Doſe ϑj twice a day.

Take of Cryſtal mineral ʒij, of the Salt of Amber ʒj, of the ſalt of Harts-Horn ϑj, mingle them : The Doſe fifteen *gr.* to twenty, twice a day with diſtilled water.

Of the Intermitting Pulſe.

The intermitting Pulſe ought, and indeed deſervedly, to be ranked with the Cardiack Paſſions, becauſe in this affection or at leaſt in ſome kind of it, the Heart it ſelf labours, but in ſomething a diverſe manner than in its palpitation or trembling : For in theſe as to its motion it is amiſs and irregular, in the other, as to its reſt; for it is ſometimes twice as long as it uſes to be according to its ordinary courſe.

Two kinds of the intermitting Pulſe.

Firſt, we ought to diſtinguiſh this affection, which (unleſs I am greatly deceived) hath two diſtinct ways of being made: For although ſometimes the Pulſe does intermit, becauſe the Heart ceaſes for that time from motion; yet beſides the Pulſe being felt ſometimes ſeems to intermit at the Wriſt, whilſt the Heart is perceived to ſhake (as it does in its trembling) moſt ſwiftly and inceſſantly in the Breaſt: The cauſe of which I ſuſpect to be, for that this paſſion of the Heart urging a very little portion only of Blood, is caſt forth at every *Syſtole* into the *Aorta*: Wherefore this being void and growing flaccid, and wanting its load to be moved away; leſt it ſhould act ſo often in vain, it ſometimes intermits its contraction, and ſeems even as in the unloading of a Ship when the wares are more difficultly, and by ſome let for a time, ſtaid in drawing them forth of the hold, the Porters that carry them are put beſides or pretermit ſome turns of going and coming. Further, in malignant or deadly Fevers, if at any time the Pulſe be quicker and weak, it alſo then intermits, the reaſon of which is not that the Heart ſometimes ceaſes from motion, (for then it moſtly and inceſſantly labours) but for as much as the Blood is not carried with enough plentiful proviſion, by every *Syſtole* into the *Aorta*; wherefore this wanting work to do, ſometimes grows idle.

Firſt, that which is excited by the default of the Aorta.

The ſecond which proceeds from the Heart it ſelf.

But moreover the Pulſe ſometime intermits, becauſe the contraction of the Heart it ſelf is ſuſpended for a certain time, or its pauſe is twice longer, which indeed any one may eaſily find in himſelf or another, by putting his hand to the Breaſt, yea thoſe who are ſick as often as the Heart ceaſes from motion, may plainly perceive it in themſelves, by the weight and oppreſſion of the Breaſt. Moreover this affection does not ſo much happen to the languid, thoſe about to dye, or that are dangerous ſick, as to thoſe well enough and as to many things in in good order; wherefore it ought not always to be taken according to the opinion of the vulgar for a diſeaſe, or for a very pernicious or ſo hurtful a ſign. Theſe who are obnoxious to this, are wont to be troubled for the moſt part alſo with the *Vertigo*, the Headach or convulſive Affections. But this defect of the Heart as to its type is various, for now the periods of Intermiſſion are certain, and determinated to a certain change of the Pulſe, to wit, the third, fourth, fifth, or ſome other more often or more rare, now they are uncertain and wandring, as a ceſſation now happens after a few Pulſes, by and by after more. The vibrations of the Artery whilſt they are continued, are well and ſtrong enough, and for the moſt part are equal, but yet ſometimes the firſt Pulſation is the greateſt after the intermiſſion, that which ſucceeds a little leſſer, and ſo by degrees they are leſſened until the intermiſſion comes again, then afterwards a great Pulſe beginning, it deſcends again as it were by a ladder to a ceſſation.

Which does not always betoken Evil.

Various Examples of it.

I have known ſome (ſo much as the buſineſs could be made known to our obſervation) that were always endued with an intermitting Pulſe, ſo that I never at any time touching the Artery could find it otherwiſe, and in the mean time they ſeemed well enough and complained of no ſickneſs. But however I have known

others

others alſo to have had an intermitting and more ſlow Pulſe than ordinary, only when a cruel Headach or ſome more grievous Affection of the Head was preſent or neer at hand.

Part I.

From theſe I think it appears that the cauſe or formal Reaſon of the Affection, but now deſcribed, does not depend upon the miſtion or *Craſis* of the Blood, but only from the irregular diſpenſation of the animal Spirits from the Cerebel into the Cardiack Nerves, and from thence into the tendons of the Heart: For it may be well ſuſpected that by reaſon of thoſe Nerves being ſomewhat obſtructed, the animal Spirits cannot deſcend to the tendons of this Muſcle with a full Channel or influx: Wherefore as their proviſion is ſomething deficient, the motion of the Heart ceaſes forthwith for one Pulſe, until more plenty of Spirits being reſtored preſently its action is continued: So we have ſeen a Mill driven about by a ſmall Stream, the water ſometimes falling and growing ſcant, to ſtop or go ſlowly for a little time, and preſently when the water flowed or roſe higher, to repeat its rotation or going round. *The Cauſe of it.*

Thoſe whoſe Pulſe is great of it ſelf and ſtrong enough, and is wont to intermit, are not only obnoxious to Head-aches and vertiginous Affections, but for the moſt part alſo to the *Incubus* and ſometimes to the Apoplexy: For if it ſhould happen that the Cardiack Nerves at firſt not enough open and fitted, ſhould be afterwards wholly obſtructed, there will be for that reaſon a neceſſity, the Heart (which is the firſt *Elater*) being made immoveable, that the whole Machine of the animated Body, ſhould preſently ceaſe from motion and conſequently from Life. *The Prognoſis.*

Although this affection having no preſent diſturbance or danger requires not any haſty cure, yet for preſervation ſake, leſt more grievous diſeaſes ſhould follow, Remedies and a certain Therapeutick Method ought to be preſcribed, at leaſt the means or way of living, as to the ordering all things rightly in the whole Life to come; yea a certain light courſe of Phyſick, to be obſerved yearly in the Spring and Autumn is wont to be preſcribed, *viz.* that as much as may be all the morbid ſeminaries lying within the ἐγκέφαλον, or apt there to be begotten, may be taken away and be provided againſt. For this end we refer hither the prophylactick method with the Medicines by us elſewhere preſcribed againſt the aſſaults of the Apoplexy. *what the Cure is.*

The Anatomical Deſcription of an Artery.

Since that we have ſhewn above that ſome Affections vulgarly accounted for Cardiack, do rather proceed from the Arteries being affected, than from the Heart; and that the inordinations of the Blood that are wont to be ſtirred up by the affections of the Mind, do ariſe by reaſon of thoſe Veſſels being irregularly contracted, therefore it ſeems worth the while and opportune, to add in this place a ſhort anatomical deſcription together with the uſes and offices both of the Arteries in general, and chiefly of thoſe which more immediately joyn to the Heart; and that the rather becauſe as the more ancient Phyſicians did much diſpute concerning theſe Veſſels, the latter attributing the whole Buſineſs of the circulation of the Blood almoſt to the Heart alone, for as much as it is a Muſcle, they have been but little ſolicitous about the Arteries.

Firſt therefore, that I may remember what the Ancients have ſaid, *Galen lib. 7. Adminiſt. Anatom.* Chap. 5. ſays, That every Artery conſiſts of a double Coat, to which (he ſays) the third and fourth may be added. Again *lib.* 3. *de Facult. Naturalibus* Chap. 11. He ſays that the Arteries have Coats like the Ventricle, and that the interior Coat has long and oblique Fibres, but the exterior tranſverſal Fibres. I will in a few words ſhew, which way and how congruouſly this agrees with our anatomical obſervation. *The Coats of an Artery according to* Galen.

For the right knowledge of this Experiment, take a portion of the great Artery or *Aorta* of a Man or Beaſt cut off, which being put upon a ſtick (whereby it may be ſtretched forth) dip it oftentimes in ſcalding water, that the Coats and Fibres being ſomething contracted and made more tumid, may be better perceived and pulled one from another, then a ſeparation being made by a Penknife, four diſtinct Coats will appear. The outmoſt of theſe thin and nervous, ſerving for a cover *The preparation for its Anatomy.* *It hath four Coats.*

Part I.

The description of the outmost.

a cover of the whole Veſſel, hath outwardly many nervous branches variouſly creeping about here and there, but in the exterior ſuperficies a texture, as it were of the form of a Net, and very thickly planted of all kind of Veſſels, and eſpecially of the ſanguiferous, covers the whole. The Arteries aſcending every where in this Coat, firſt from the coronary Veſſels, and then out of the Trunk of the *Aorta* and from its branches are ramified or branched with Veins and Branches in like manner, ſent forth from its hollow. Moreover, the nervous Branches meeting with both theſe are variouſly complicated, and ſo of all theſe interwoven is made as it were a certain Net every where covering the Arterious Tube; from which very ſmall ſurculs or little ſhoots of every kind of Veſſels, ſhoot forth into the other underlying Coats of the Artery.

The ſecond Glandulous.

2. To this retiform Coat another glandulous ſucceeds, or rather that ſticks cloſe to this placed upon it. This membrane being planted through the whole with very little and whitiſh Glandula's, is after the ſame manner as the interior glandulous Coat of the Ventricle and Inteſtines lying under the hairy Cruſt, alſo from the back of which a retiform or Net work enfolding of Veſſels is every where diſpoſed.

The third is Fibrous and muſcular.

3. In the third place it hath a muſcular or fibrated Coat, *viz.* contexed or woven thickly with accumulated tranſverſe or annulary Fibres. Theſe fleſhy and moving Fibres, compaſſing the Arterious Tube are not ſcattered by a thin and ſingular *ſeries*, as in the Veiny Coat, but in a certain heap, ſome lying upon others, they make a very thick Skin. Their rows or orders being ſcalded in the Artery, may be very eaſily ſeparated and pulled one from another, which in like manner ſeem (as thoſe of the Ventricle and Inteſtines above deſcribed by us) altogether fleſhy and moving.

The fourth nervous has right Fibres.

The fourth and interior Coat of the Artery, inveſting its Cavity and covering the underlying Coat, is thin and almoſt wholly membraneous: Its little nervous Fibres being ſtretched long ways, cut the anulary Fibres in right Angles; and it ſeems that theſe are thoſe right Fibres of which mention is made by *Galen*, and ſtill by other Anatomiſts: But what they call oblique I think to be only imaginary, becauſe they are no where to be found in this Veſſel. But it appears this error to have been familiar to ſeveral Phyſicians, to wit, that they have aſſigned to many *Viſcera's* and membraneous parts, right, tranſverſe, and oblique Fibres, out of a falſe ſuppoſition that there was in every one of them, an attractive, retentive, and expulſive faculty, and that theſe three Offices ſhould belong to the three orders of Fibres, all which indeed will appear to any diligent enquirer, to have been falſly aſſumed and upon truſt. In the mean time I ſo far aſſent to *Galen*, that I acknowledge four diſtinct Coats of the Artery, yea thoſe to be in this Veſſel even as in the Ventricle, except yet that in the *Viſcera's*, the retiform infolding of the Veſſels together with the Glandulous Coat, is placed under the fibrated or muſcular Coat, but in the Artery above it.

The uſe of the Coats.

So much for the conformation of an Artery in general, and its conſtitutive parts: As to what belongs to their Offices and reaſons, it ſeems that the muſcular Coat endued with fleſhy orbicular Fibres, is of the chiefeſt uſe and operation. For this as we have already hinted, obeying the motion of the Heart, in driving about the Blood obſerves the perpetual turns of *Syſtoles* and *Diaſtoles*, for that whilſt the fleſhy Fibres of this are ſtrained ſucceſſively, and with wonderful celerity behind the River of Blood, there will be a neceſſity for its courſe to be moſt rapidly made from the Heart even to the extremities of the Arteries.

The fibrated for the Syſtoles *and* Diaſtoles.

The other Coats for the benefit of this.

As to the other Coats, and the Veſſels diſtributed through them, they ſeem to be all inſtituted for the commodity and uſe of this one muſcular Tunick: For in the firſt place the Nerves and their ſhoots every where ſowed upon the Trunk of the *Aorta*, and its greater branches, and appearing outwardly do carry to the underlying fleſhy and moving Fibres, after their manner abundance of Spirits for the performance of the continual task of *Syſtoles*, and beſides they carry (as we have ſhewed before) the inſtincts of Sympathetick Contractions. Then the leſſer Arteries (which we meet with next) ſtrictly covering the interior ſuperficies of the outmoſt Coat, lying next to the muſcular Coat, are charged even as the other Arteries next the other muſcles and ſolid parts with a double duty, to wit, that they convey and bring to the ſpirits continually to be renewed, the alible or nouriſhing

To what end the retiform folding of the Veſſels is.

nouriſhing juice by which they are nouriſhed and grow, and elaſtick Particles; then the Veins, the companions of the Arteries carry back whatſoever is not otherwiſe expended of the Blood. Part I.

But that theſe ſanguiferous Veſſels, planted without the muſculary Coat, and complicated among themſelves, do conſtitute as it were a retiform fold, from which only moſt little and very ſmall ſhoots are ſent forth, (as it is alſo about the Ventricle and Inteſtines) when as in many other muſcles, theſe Veſſels are interwoven with the fleſhy Fibres, and make them therefore to bluſh or ſeem red: The reaſon of this difference ſeems to be, for that it is requiſite for the ſanguiferous Veſſels to be ſeparated a little and placed at a certain diſtance from the fibres of the *Aorta*, and the motional of the *Viſcera's*, leſt that the Blood perchance waſhing theſe more plentifully ſhould be ſometimes obſtructed, and ſo bring forth a Phlegmon, or a ſoon killing Impoſthume: Wherefore for the greater caution againſt ſuch an accident, the glandulous Coat always coheres to the retiform folding of thoſe Veſſels; to wit, for that end that the ſeroſities flowing over and above, both from the Nerves and from the Arteries, and not preſently carried back by the Veins, might be preſently received by thoſe numerous Glandula's, and until they may be carried back to the Blood, (leſt they ſhould ruſh upon the moving Fibres, and ſhould affect them with a Cramp) might be there contained.

The uſe of the glandulous Coat.

In the Artery the folding of the Veſſels is above the muſculary Coat, but otherwiſe in the Viſcera.

But that the net work folding of the Veſſels, and the glandulous Coat ſticking to it, is placed above the muſculary Coat in the *Aorta*; and in the *Viſcera* under it: The reaſon unleſs I am deceived, is this, *viz.* that theſe ſmall Veſſels which ought gently and moderately to diſpenſe the Blood and Juices, might be removed as far as might be, from the eſtuation of the ſanguineous Torrent within the *Aorta*. But in the Ventricle and Inteſtines, for the rightly performing of the Offices of Concoction, there is need of the former fire of the Blood.

The reaſon of this.

The inward Coat of the *Aorta* inveſting its Cavity; ſeems to be chiefly conſtituted for theſe uſes, that it might carry within it the Bloody Channel, and terminate the other parts of this Veſſel: But beſides we muſt yield to this ſomething of ſenſe, and perhaps ſomething alſo of motion, for this being endued with nervous Fibres, is affected by the Blood paſſing through it, juſt as the Boſom of the Heart; and for that cauſe according to the ſenſe of this, the muſculary Coat is urged into frequenter or ſlower, equal or inequal motions of the *Syſtoles* and *Diaſtoles*. Moreover, this Coat has neer the Heart for the ſpace of about two inches, greater, and as it were, fleſhy right or longitudinal Fibres, in ſo much as I ſuſpect in this place, by reaſon of the greater impulſe of the Blood, the Artery not only to be ſtrained and ſtraitned as to its amplitude, behind the ſtream of the Blood, but like as in the heart, it to be contracted and ſhortned ſomewhat as to its longitude alſo at every *Syſtole*.

The uſe of the inward Coat.

I might here add many other things about the ſtructure and uſe of this Veſſel, not leſs profitable than pleaſant to be known, ſo full and fruitful of contemplation is every the moſt little part or portion of the animated Body, that the more full knowledge of every of them ſingular being wrote down, might fill many Pages, yea the whole Book. If I ſhould go any further in this digreſſion, it would follow next to ſpeak of the Veins, but it being omitted for this conſideration (ſince that it makes little or nothing for the unfolding the reaſons of Evacuation) we will paſs over to the other kind of Medicines, to wit, to Hypnoticks.

SECT.

Part I.

SECT. VII.

CHAP. I.

Of Opiate Medicines or Causing Sleep

The vicissitude of Sleeping and waking necessary for health.

AFter the Cardiack Medicine by a certain Law of Method, the Hypnotick follows. For that Sleep oftentimes comes moderately and seasonably it becomes of it self a great Cardiack Remedy. But this passion is not always wont to be present, when nor as it ought to be, but sometimes affects us evilly with its troublesome presence, sometimes with its absence. By the true institution of Nature, Sleep and Waking, as *Castor* and *Pollux*, ought to have their turns one after another, and the one to give place to the other, according to the just bounds of Reigning. This vicissitude so long as it is rightly observed, doth very much conduce both to the preserving the health of the Body, and to the furnishing of the gifts of the Mind: But if the dominion of either of them be too long continued, it will quickly be that there will not be long a whole mind in a whole Body. By immoderate sleep, all the faculties both of the natural and animal Function, become very much stupified, and from hence one becomes more fit for the Grave than for Society. On the contrary, over great Waking destroys the strength, and makes infirm or perverts the Animal powers: Wherefore among the Remedies accommodated to our needs, the most wise Creator hath abundantly provided for these uses, to wit, that it should be in our power to procure or repel Sleep aud Waking, as often as it shall seem convenient, and as often as they shall offend in excess, or in defect to moderate them: Which Medicines and by what means of working on the humane Body, they are wont to procure these desired effects, it now lyes upon us to shew, and first we will speak of Opiates or Remedies procuring Sleep.

In the tract of the Affections of the Brain.

That it may better appear what the Hypnotick Medicines do, and by what kind of affection of the Brain, animal Spirits, and of the other parts they cause Sleep, hither ought to be referred what we elsewhere have very largely discoursed, concerning the Nature, Subject, Causes, and effects of Sleep: To wit, we have shown the immediate subject of Sleep to be the animal Spirits, not all, but only of the Brain, and the inhabitants of the nervous *Appendix*, *viz.* which execute the Office of all the Senses, and of every spontaneous motion, they in the mean time being taken away, which serve for performing the actions of the merely natural and vital faculty.

The Contents of the Opiology are four.

These things being premised concerning Opiates, it shall first be enquired into, by what means they affect the animal Spirits, so that as it were by a blast of a Medicine, they presently as if they were bound fast in Chains, subside or sink down and leave their Tasks. In the second place it behoves us to shew where the Hypnotick Medicines begin their operation, *viz.* whether in the Ventricle or the Brain, or whether not in both together, or successively. In the third place, it shall be determined how far Opiates do extend their energies, whether they reach only to the Spirits of the Brain, and the inhabitants of its *Appendix*, seeing that they only are capable of natural Sleep, or else to the others of the Cerebel or little Brain also, and to those presiding in its Dominion. Lastly, in the fourth place, it will be worth our labour to add some notable Effects and Accidents of the chief Hypnoticks, together with the reasons of them.

1. As

Part I.

1. As to the firſt of theſe, to wit, that it may appear by what means Opiates do affect the animal Spirits whilſt they bring them to ſleep, we have in another place largely declared our opinion: which is that I think they do not exerciſe their powers by raiſing up vapours into the head, nor by opening the Pores of the Brain, whereby the vaporous matter or otherwiſe ſoporiferous is admitted; but only by deſtroying or profligating ſome animal Spirits, wherefore the reſt as being amazed, or compelled more inwardly, or at leaſt being called back from their wonted Efflux into the nervous parts, do relinquiſh or remit for a little while their Tasks. It manifeſtly appears to be ſo, becauſe Narcoticks, if they are taken in too great a Doſe, for as much as they deſtroy the ſpirits in ſo great abundance that the vital Function can be no longer obeyed, cauſe death. But they being given in a juſt quantity, and with other circumſtances aptly agreeing, for as much as they overthrow and amaze ſome ſpirits, and wholly extinguiſh others, they allay the too great fierceneſs and impetuoſity of the ſenſitive Soul, for the end that ſhe being made more contract, and as it were ſinking down within her ſelf may ly quiet: almoſt by the like means as when the inſperſion of water cauſes preſently the compaſs of the flame more vehemently breaking forth to be reſtrained, and to be reduced within moderate bounds.

1. How Opiates do affect the animal Spirits.

If that it be further asked, in what matter and how diſpoſed the narcotick Virtue of the Medicine conſiſts? no manifeſt quality as of cold, heat, or of other kind ought to be pretended, nor preſently muſt we fly to I know not what occult qualities. It may be lawful to ſuppoſe that Opiates do conſiſt in ſuch kind of Particles, which are greatly contrary to the animal Spirits, and are extinguiſhers or rather poyſoners of them. It will not be eaſy to ſhew of what ſort of ſubſiſtences or conformation the contrary Particles of either kinds are, becauſe they are not perceivable by the ſenſe, and the Anology of the like adverſe Particles is not met with in any other ſubjects. But yet as it is lawful to conjecture, it ſeems that as the animal Spirits are moſt ſubtil little bodies, compoſed of ſpirits and volatile ſalt united together and highly exalted; Opiates on the contrary conſiſt of a ſtinking Sulphur, that is of Sulphur, with a fixed ſalt and earthy matter combined together, and carried forth to an efferation or fierceneſs; which kind of concrete, is well enough known to be ſo much contrary to the ſubtil texture of the animal Spirits, that ſometimes they profligate them at a diſtance by their mere *Effluvia*, they being ſcarce or not at all perceivable by the ſmell; but their Particles (after they are taken inwardly) being diffuſed thorow the blood and nervous juice, wherever they meet within them ſome of the Bands of the Forces of the animal Spirits, they poyſon them and as it were extinguiſh them. But in what places this is firſt or chiefly done ſhall be next inquired into.

In what kind of Particles their virtue conſiſts.

2. We have formerly ſhewn ſpeaking of ſleep, this affection according to the ordinary rites of Nature to begin from the ſhell of the Brain, *viz.* the Spirits dwelling there and being as it were watchmen firſt of all to recede, and their Arms as it were being laid aſide to give way to Idleneſs; then preſently all the reſt to whom theſe Idleneſſes are permitted, in like manner lying down to indulge ſleep.

2 In whatplaces Opiates do firſt and chiefly operate.

Theſe ſpirits of the firſt Band being about to obtain Reſt, relinquiſh their Stations either becauſe they are wearied or leſned in their forces, they of their own accord leave their Tasks until they may be recreated, or becauſe they are drawn away from thence, or laſtly drawn more inwardly by ſome gentle or pleaſant handling. The firſt of theſe ordinarily and often happens by reaſon of an influx or inundation of the nervous juice, and ſometimes of the ſerous *Latex*. For thoſe humours being poured forth from the Blood (whilſt that it is ſatisfied) waſhing the outmoſt Bounds of the Brain, into its cordial or ſhelly ſubſtance, fill the Pores and all the paſſages, and ſo they repreſs the ſpirits and hinder them from their free expanſion by which they make their watches. The reaſon of all theſe and the means of doing it we have already largely declared in another Tract: From which being truly weighed it will be juſt to think that the Particles of every kind of Opiate after it is taken being carried iuto the Blood, and circulated with it doth chiefly exerciſe its narcotick or ſtupefying force neer the ſhell of the Brain; for they meet within this place the firſt forces of the animal ſpirits, and deſtroy or rather extinguiſh wholly many of theſe placed in the fore part of the Battle; then, by reaſon that the other ſpirits of this Troop being made now thinner go back, and their

To wit, firſt in the ſhell of the Brain

Part I.

emanation being reſtrained fly towards the middle of the Brain; and ſo whilſt theſe withdraw themſelves from the Battel, and rejoyce for their retreat, all the reſt within the ſenſories where they are placed as in ſo many watch-towers, their ſuccours being gone, ſome follow and leaving their watches recede, and give way to idleneſs.

Where they deſtroy the outmoſt ſpirits and compel the next to theſe to go backwardly.

After this manner the Particles of Opiates for as much as they profligate, and deſtroy certain animal Spirits ſtanding in the *Cortex* of the Brain, and do repel and put to flight thoſe which are next, ſo that their influx to the Senſories is ſuſpended, they procure ſleep; but yet by what means, in ſo ſhort a ſpace (as it ſometimes happens) *viz.* preſently aſſoon as the Medicine is taken, and whilſt it is ſcarce diſſolved in the Ventricle, ſleep creeps upon one, when it ſeems to be a work of ſome little time, in which the ſoporiferous Particles may be carried from the Stomach into the Blood and thence by its paſſage to the Brain, is not eaſe to unfold. Firſt I may ſay to this that the Journy from the Ventricle to the Head by the Blood is expeditious enough, and may be performed in a very little time: but beſides I am led to opine that Opiates ſometimes by acting more immediatly on the Ventricle and by its mere contact before there is any commerce of the Blood, do after a ſort procure ſleep. Elſewhere we have deſervedly aſſigned among the evident cauſes of this Affection the aggravation of the Stomach; for how often does any one, having eaten more groſs and undigeſted meats cauſing trouble and heavineſs of the Stomach become preſently ſleepy? The reaſon of which ſeems to be for that there is a great affinity between the ſpirits of the Stomach and thoſe inhabiting the Brain, and an intimate Sympathy betwixt them, ſo that the afflictions and evils of either of them do afflict the other (which indeed may very eaſily be ſhewn in many Inſtances) hence it eaſily comes to paſs that by reaſon of the ſpirits which preſide in the Ventricle being highly oppreſſed, and hindred from their free expanſion, and as it were expulſed, preſently the *Hypoſtaſis* of the whole Soul and eſpecially that principal part ſet before the Brain in like manner is ſtraitned contracts its Sayls and ſubmits its whole ſelf to the yoak of ſleep. How much the rather may it be thought when at any time the ſpirits of the Stomach imbibing the opiatick Juice are impoyſoned, and in a great abundance deſtroyed, that preſently all thoſe watching about the ἐγκέφαλον do every where give place, and are oppreſſed with ſleep, which is not only the Image of Death, but ſometimes one and the ſame? Indeed we have related elſewhere a very rare and true Hiſtory of ſuch kind of effects from *Opium* being taken, *viz.* of a certain ſtrong man and moderatly healthful, who having taken too great a Doſe of *Laudanum* for the aſſwaging the colick pains was immediatly taken with an intollerable weight and ſtupor about the Ventricle, and within four hours dyed, neither yet did there happen to him any ſleep, but his laſt and deadly.

They leſſen or call back their Efflux to the nervous parts.

Opiates by ſome means whilſt they are in the Ventricle do exert their virtues.

The reaſon of this unfolded.

Theſe are the chief and moſt uſual places, *viz.* the Ventricle and the *Cortex* of the Brain in which Opiates exerciſing their powers do begin or procure ſleep. Notwithſtanding it appears beſides by common obſervation that they being adminiſtred after many other ways, do impreſs a certain Narcoſm or ſtupefaction to the whole ſenſitive Soul or at leaſt to a portion of it which is ordinarily and naturally capeble of ſleep. A Liniment of *Opium* being applyed to the forehead, alſo an *Enema* imbued with its ſolution are ſoporiferous. Some have found to their damage the like effect from the ſame things being put into their Noſtrils or a hollow tooth; ſo that it appears that this Medicine may be admitted from any place to the animal Spirits, and doth deſtroy whatſoever are next it by its mere touch; and ſometimes ſo that a contraction or ſinking down of the whole Soul as it were being moved with an Eclipſe of the principle Faculties follows: although it is alſo very like that the Particles of the *Opium* may be carried from thoſe places by the paſſages of the Blood to the *Cortex* of the Brain.

3. How far and to what parts the virtue of Opiates doth reach.

Having thus ſhown you the weapons of Opiates by which they effaſcinate or hurt, and the place where they firſt or chiefly operate, now follows to be ſpoken of the Sphere of their Activity, *viz.* into what parts or Particles of the Body, and how far in them they extend their forces. By what hath been already ſaid it appears plain enough that they act upon the animal Spirits; but let us ſeek if not alſo upon the Blood, and other humours? certainly that the Blood is not at all vitiated by them, I judge firſt from their ſo very little Doſe, by which it is highly improbable for the Blood to be empoyſoned or corrupted: then for that though

They do not empoyſon the Blood as they do the Spirits.

Narcoticks

Part I.

Narcoticks be often applyed, yet no *Stigma*'s or Puſtles or little whelks appear in the skin or *Viſcera*, which uſe to happen to the Blood being any ways empoyſoned. Moreover to whom the uſe of *Opium* becomes familiar, that it does not hurt the animal Spirits although daily taken in a great quantity, no Dyſcraſy of the Blood is wont to be produced from thence. In the mean time we muſt not think the Particles of *Opium* to be agreeable to the blood, and to be aſſimilated by it, but rather to be wholly heterogeneous and immiſcible: wherefore it is no ſooner come into its Maſs but by and by they are expelled from it, and from thence being partly poured on the *Cortex* of the Brain, cauſe ſleep, partly caſt forth by the pores of the skin ſtir up Sweat, and not ſeldom an itching (as I have obſerved in many) very troubleſome. As to the other Humours, I ſee no reaſon for us to judge that Opiates do affix any blemiſh to the *Serum*, or nervous Liquor, or laſtly to the nutritious Juice; ſo that their virtue, and energy ſeems to belong to the animal Spirits.

Opiates primarily act upon the Spirits inhabiting the Brain.

Notwithſtanding they are wont to affect all theſe not after a like manner, but Opiates given in a moderate Doſe do chiefly and almoſt only reach to thoſe Spirits to whom the priviledges of natural and ordinary ſleep is granted, the reſt being either untouched or not much hindred. Wherefore from *Laudanum* being taken the ſenſes both internal and external are tied up, in the mean time the Pulſe, Reſpiration, alſo the offices of concoction and ſeparation are performed after their wonted cuſtom, and after ſome time the ſpirits of the former Dominion, their forces being reſtored do laſtly ſhew themſelves, and the chains of ſleep being ſhaken off return of their own accord to their wonted watches.

when their force reaches to the Cerebel or little Brain.

If that an opiatick Medicine is more ſtrong then it ought to be, it not only impoſes more ſtrong chains on the ſpirits of the Brain and thoſe inhabiting its *Appendix* whereby they are longer bound up, but alſo inlarges its narcotick force into the other province of the animal Dominion; ſo that after its larger Doſe the appetite is for the moſt part beaten down, reſpiration very much ſtraitned, and is rendred not only difficult but alſo unequal; and alſo ſometimes the motion of the heart it ſelf fails ſo much, that the Pulſe being weaker there happens a certain Eclipſe or *torpor* of all the faculties with a cold Sweat, ſo that ſometimes from ſuch a Medicine follows a perpetual ſleep, the reaſon of which is for that the opiatick Poyſon being further diffuſed goes into the Globe of the Cerebel or little Brain and deſtroying or utterly diſcomfiting in great abundance the ſpirit inhabiting it, cauſes the motion of the Heart at firſt to grow weak and then quite to ceaſe, ſo that the vital Flame is extinguiſhed.

4. *The good or evil effects of Opiates.*

Theſe things being premiſed concerning the nature, manner of working, ſubjects, and limits or Sphere of Activity of Opiates, it now lies upon us to recount the chief effects and accidents both good and evil which are wont to happen from the uſe of them: and then to add ſome cautions about the right method of Hypnotick Medicine, therefore let us ſee in the firſt place, after what manner and in what caſes opiatick Medicines are wont to be helpful.

1. *Their good reſpect either the Spirits or Blood and Humours.*

The good or benefit to be procured by the uſe of Opiates is wont to belong either to the animal ſpirits or to the blood and Humours: Thoſe are indeed firſt and more immediatly, theſe only ſecondarily and by the means of thoſe affected.

They are required for the ſpirits as to the ſenſitive or motive Function.

To either in a various reſpect.

As often as the animal Spirits being above meaſure ſtirred up act either too much or irregularly about the performing their offices for the allaying their force or inordinations, Narcoticks being timely adminiſtred do oftentimes bring notable help: thoſe kind of exorbitancies for which the uſe of Opiates is preſcribed, reſpect either the ſenſe or motion. As the former Function is twofold, the chief vices of the internal ſenſes are watchings and *Delirium*; but the ſickneſs of the external chiefly requiring this Medicine is pain. The irregularities of the Motions to be rectified by Narcoticks are firſt a more vehement Pulſe, Convulſions of the *Præcordia* or *Viſcera*, and alſo the too violent and exceſſive excretions of theſe. So there are many and divers caſes in which whilſt the animal Spirits like fierce and furious Horſes run about, or leap beyond their bounds, they ought to be reduced or reſtrained by Opiates as it were with Bridles. We ſhall here briefly ſet down ſome inſtances of every one of theſe together with the means of doing and the reaſons of curing.

In reſpect of the watching of the internal Senſes.

1. In the firſt place therefore Opiates are neceſſarily and exceeding properly preſcribed for watching or waking, for as much as ſleep is an Affection contrary to this, and for that reaſon it becomes curative. For what cauſes and by what

Part I.

means watchings are wont to be excited and to remain a long time, we have largely enough ſhown in a late Tract; in all thoſe Caſes of the animal Spirits being ſometimes too much carried forth, and being of themſelves inquiet and importunate ſince they every where blow up and irradiate both the ſenſorie Organs, and eſpecially the outmoſt Border of the Brain; the opiatick Particles, being carried hither by the paſſage of the Blood do forthwith deſtroy or caſt down or ſcatter the Spirits watching in the forefront, ſo that the next who being compelled do abide more inwardly, and being kept from their emanation on every ſide, they are reſtrained very much, wherefore preſently all the extrinſick Spirits inhabiting the Organs of every Spontaneous, both ſenſe and motion, being deſtitute of the wonted Afflux of thoſe Capitals do alſo leave their watches and retiring inwardly do become Idle.

2. *and* Delirium.

Secondly in Delirian Affections Opiates are often adminiſtred with benefit (although ſometimes they rather hurt, as ſhall be hereafter declared) the reaſon of the former is that when the Spirits being too much ſtirred up within the Brain, and ſtruck as it were with a fury they eaſily leap beyond the cuſtomary and wonted Paths of their Paſſages, then a narcotick Medicine approaching nigh to the border of the Brain, doth repreſs them blown up like hounds that are apt to expatiate, and ſtops them a little while from all motion, as oftentimes when they are at laſt moved they repeat their former methods and rightly perform their ancient Functions.

In reſpect of the external ſenſe for pain.

Thirdly *Opium* is eſteemed of moſt excellent uſe for the quieting all manner of Pains whatſoever, wherefore it deſervedly is wont to be called *Nepenthe*, and is a truly divine Remedie. And indeed we can ſcarcely enough admire how this Medicine, whilſt ſome notable torture or intolerable Pain of ſome Member or the *Viſcera* doth afflict, as it were an Inchantment doth yeild a ſudden help and Ceſſation from Pain, yea ſometimes without ſleep or at leaſt before ſleep comes. Moreover 'tis yet more ſtupendious that whilſt the Opiatick Particles do continue to operate and to exerciſe their narcotick or ſtupefactive Power, yea ſometimes a little after ſleep is ended there is an high Alleviation or eaſement and freedom from Pain in the Part afflicted, but then the force of the Medicine being ſpent, the Pains return, neither do they remit their atrocity, unleſs whilſt they are charmed again by the ſame Medicine.

By what means Opiates do allay Pain without ſleep or after it is ended.

It doth not eaſily appear to him who ſearches the reaſon of this, in what part the Anodyne Medicine doth moſt ſtrongly operate and exert its Virtue, whilſt it allays Pains without ſleep or after it is finiſhed, and continues its Ceſſation for ſome appointed time, *viz.* whether its narcotick Force is imployed on the grieved Part, or on the common ſenſorie, or on the whole ſenſitive Soul. The reaſon of the Difference of the propoſitions is, becauſe Pain being excited in one place is felt in another, and its effect is poured forth through the whole Soul. Its production conſiſts in this, that the nervous Fibres are irritated very much, and pulled one from another by ſome incongruous, and greatly unproportionate thing, ſo that the Spirits abounding in them are by and by diſtracted, and being ſnatched from their equal expanſion are agitated into Confuſion: but the ſenſe of Pain is effected for as much as that perturbation of the Spirits, by a certain undulation through the nervous Paſſages to the common ſenſory, *viz.* chamfered, delated Bodies, doth ſtir up the Spirits there implanted into the like Diſtraction: which ſort of Affection going forward even to the very middle of the Brain, moves the Imagination, and from thence being preſently reflected thorow the whole *Hypoſtaſis* of Spirits, diffuſes a certain trouble or inquietude. Therefore as this Pain is a Paſſion ſo largely extended and of ſo various a reſpect, it may well be ſearched into, what kind of Sphere of Activity Anodynes have.

Concerning theſe there is no cauſe of Doubt, but as often as ſleep is induced by *Opium* being firſt taken, a Ceſſation from Pain conſequently ſucceeds: then alſo this more immediate effect of it preſently follows; to wit, for as much as thoſe which actuate the firſt ſenſory are alſo bound with the Spirits inhabiting the Brain; and for that cauſe although the paining Part be irritated, the ſenſe of all Pain is inhibited: but indeed that when the patient awakes, and ſo remaining doth lively exerciſe all the animal Functions, continues free from Pain for many hours after the *Opium* is taken, and then the ſtrength of the Medicine bein ſpent preſently the ſame Tragedy returns, this Knot certainly deſerves to be looſed.

For

Part I.

For the ſolving of which we may not ſay, the Spirits of the grieved part, or thoſe inhabiting the common ſenſory, *viz.* either theſe or thoſe ſingly or both together are bound by the Anodyne Medicine. For that it is not credible for the particles of the *Opium* ſo to penetrate and ſo deeply to enter into the Brain and nervous Stock, that in ſo ſhort a time they ſhould deſcend, that being overcome and unhurt to its outmoſt Confines; further neither is it to be thought, that the Spirits inhabiting the chamferated Bodies (whilſt the *Analeſia* or Ceſſation of Pain for ſome time during the waking remains) being awakened for the receiving of all the Impreſſions of other ſenſibles, are made deaf only to the approaches made from the paining part. Since therefore the Indolency after ſleep is finiſhed, ought to be referred neither to the grieving part, neither to the firſt ſenſory ſtupefied by the *Opium*, let us ſee how the reaſon of this may be deduced from a certain narcotick Affection of the whole ſenſitive Soul. After we have premiſed theſe two things this will eaſily be manifeſted.

The reaſon of it unfolded.

In the firſt place it is abſolutely neceſſary for the ſtirring up or continuing of any pain, that there be a very great plenty of Spirits abounding in the part affected: becauſe the excandeſcency, diſtraction, and mutual alliſion or beating of the tumultuating Spirits one againſt another, are the conjunct Cauſes themſelves of that troubleſom ſenſe which is called Pain; wherefore if that an afflux of Spirits from the bound Nerves to the paining place may be hindred or much diminiſhed, there will be a neceſſity for the Pain to ceaſe; for that thoſe Spirits being deſtitute of new forces or ſupplies, ly ſo thinly and diſperſed in the Fibres, that they ſcarcely touch one another, at leaſt that they do not break forth into furie and indignation.

It conſiſts in thoſe two things, viz. *In the firſt place there is required to Pain a copious Afflux of Spirits to the part affected.*

2. This kind of Deſtitution or withdrawing of Spirits here required for the cauſing an *Analeſia* or Ceſſation from Pain, and may be procured by no other remedy or experiment is very often produced by *Opium* being given. For truly not only ſome outmoſt, and as it were precurſory Spirits (as is ſaid) are deſtroyed by the Particles of this Medicine beſieging the Border of the ἐγκέφαλον, but the firſt ſpringing forth of theſe within the midſt of the Brain and Cerebel, and for that cauſe the Efflux upon the nervous Stock by and by are greatly ſuppreſſed, ſo that during the Energie of the *Opium* they are diſpenſed much more ſparingly and leſs into the *Præcordia*, *Viſcera*, yea and into all the other parts. Hence the Pulſe and reſpiration do remit of their vehemency and quickneſs, and ſometime this becomes ſuddenly difficult or hard and that weak or debilitated; alſo for the moſt part there comes upon all the Members and Limbs an unwonted Languor and Sloathfulneſs. Moreover from hence the *Viſcera* being before provoked into either excretory Convulſions by Vomit or Stool, or dolorifick as in the Collick or Stone, do leave their inordinations: *viz.* for this reaſon becauſe whilſt that a ſubſidiarie plenty and Supplements of Spirits are wanting in the part afflicted, thoſe few that are left are not at leaſure any longer for tumult and anger: yea that they may be able to ſubſiſt and maintain themſelves they ly quiet: But afterwards when the Particles of the *Opium* being ſcattered or blown away, the ſtock of Spirits within the *Encephalon* and their emanation from thence on the nervous Parts is renewed, ſo that they may deſcend again to the Parts affected in a full Stream and fill full again their Fibres, forthwith by reaſon of the Spirits being again accumulated and ſtirred up as before, the ſame Convulſions or Pains return.

which Opiates ſuſpend.

For the ſame reaſon Opiates take away Convulſions.

Without doubt according to this means of affecting and according to the reaſon but now aſſigned Opiates do for the moſt part quiet the fierceſt Pains, and do procure an Indolency with or without ſleep, and do continue it for ſome determinate time after ſleep is a good while finiſhed; which ſpace being elapſed, the Pains by and by do wax grievous again and are ſhortly increaſed to their wonted fierceneſs. The Effect of theſe kind of Affections, is commonly enough known in the Cure of the ſcorbutick Colick, and ſeems as it were a certain Exorciſm; for as much as the Pain, as a *Dæmon* or evil Spirit may be only bound for a certain determinate Time, and then again begins to rage. Among the dolorifick Diſeaſes to which *Opium* brings help, the Gout and Stone in the Bladder may by right challenge a place. In Arthritick Pains that Anodyne has been an egregious and as it were a divine Succor. This latter Diſeaſe, when it rages moſt cruelly in old Men and that they cannot be cured by cutting, it admits of eaſe by no other Remedy but from

They help in the Stone and Gout.

Part I.

from Narcoticks. Wherefore in this caſe I have perſwaded ſome to the conſtant and daily uſe of *Laudanum* or *Diacodium*, which as they have done with great comfort of Life, they got no hurt by it, although they encreaſing its Doſe aſcended to a great quantity. So much for the Reaſons of healing or helping the to be regulated enormities of the ſenſitive Function which *Opium* is wont to help: let us at length ſee how, and how much this *Panacea* ſerves for the healing or quieting the irregularities of Motions,

2. How Opiates help the irregularities of the motive Function.

2 The Immoderation or Irregularity of the motive Function for the rightly compoſing of which the uſe of Opiates is preſcribed, have chiefly a reſpect to the *Præcordia* and *Viſcera*; (for Convulſions about the Head and Members do not ſo neceſſarily require this Medicine.) To the firſt of them ought to be referred the Pulſe, and Reſpiration, as often as this or that ſhall be more frequent or more vehement than it ought: For when in Fevors the motions of the Heart and Lungs being more intenſe do more rapidly carry about the Blood ſo that then both as to its accenſion, and as to its *Craſis* it is greatly perverted, and cannot ſeparate its ſuperfluities being ſo thorowly incocted, the impetuoſity of thoſe parts is ſomewhat broken by a Narcotick being adminiſtred; ſo that the Blood by and by being gently and temperatly Circulated it diffuſes a leſs intenſe Heat, and being looſned in its Joynting, ſends forth its *Serum*, and impurities by Sweat and Urine. Opiates do extenuate and depreſs the Act of the Pulſe, and of Reſpiration; for as much as they do ſomewhat ſtop the Springs of the animal Spirits in the little Brain, and diminiſh their efflux from thence deſtinated to the nervous *Præcordia*, which if it ſhould happen to be too much, then a great dejection of the Vital Function, yea ſometimes Death follows.

1. They leſſen the vehemency of the Pulſe and Reſpiration.

They regulate the inordinations of Reſpiration.

Reſpiration not only as it is vehement but alſo for as much as the ſame may be interrupted, Convulſive or divers other ways irregular, frequently hath need of a Narcotick Medicine; this is wont to help before all other Remedies in a violent or very frequent and continually troubleſom Cough. But in Aſthmatick Paroxyſms where the Organs of Reſpiration being moſt laboriouſly exerciſed, the diſeaſed ſeem to be in the very Agony of Death it ſelf, a Doſe of a very fit Opiate, as it were unexpectedly renders all things preſently ſerene and tranquill. The reaſon of which ſort of Affections is, that in thoſe Diſpoſitions where ſome trouble doth beſet the chiefly vital Parts, the Spirits inhabiting them being highly irritated break forth into cruel Excandeſcencies and by acting too much diſturb and invert all things: wherefore when a Narcotick being taken, the Succors are drawn away from the Spirits ſo raving, they preſently being extenuated and as it were ſuccourleſs, lay down their inordinations. Further a Narcotick Medicine ſeems no leſs neceſſary againſt the immoderate or Convulſive motions of the *Viſcera*, *viz.* of the Ventricle and Inteſtines. For this is wont oftentimes to help chiefly in horrid Vomiting and in too exceſſive or violent purging. The Dyſenterick Affections can ſcarce be cured without *Opium*; not that this Medicine fixes the boyling, and fierce Juices and Humours, but ſtops the excretory Convulſions of the Fibres, and that partly by ſtupefying by its meer Contact the ſpirits implanted within the Cavities of the *Viſcera* themſelves, and partly by ſuppreſſing the Spirits within the Cerebel about to flow from thence to thoſe parts, of whoſe aid being deprived they eaſily lay aſide their Convulſive Excandeſcencies. I might here recount the Convulſions or pains of other parts that are wont to be either allayed or taken away by *Opium*, but there is now enough ſaid of the Energy of this Medicine, and of the Effects of Anodynes which are ſhewn firſt and chiefly on the animal Spirits; let us now ſee what kind of Virtue and alterative force it obtains on the Blood and Humours.

Further Opiates do allay the excretory Convulſions of the Viſcera.

How Opiates operate on the Blood.

And indeed there is no body almoſt of an ordinary Capacity but ſees plain enough that Opiates operate on the Blood and Juices of our Body and do allay their Inordinations. In Catarrhs and Defluxions of every kind, we fly oftentimes to theſe as to the laſt Refuge; theſe ſtrongly ſtay bloody excretions, alſo reſtrain the Serous when they are exceſſive and colliquative or melting, or reduce them: They repreſs the immoderate Ebullition of the Blood growing fevouriſhly hot, and leſſen the too great inkindling thereof. Laſtly theſe happily quiet all fluxes from whatſoever cauſe ſtirred up in our Body, and induce moſt often an Halcyon or calm ſtate to the Blood however diſturbed.

Although

Part I.

Although theſe ſort of Effects for the moſt part are produced (as we intimated before) thorow the mediating Affections of the animal Spirits (for that the nervous Fibres being inordinately contracted do agitate the Blood and Humours, and compel them into divers fluctuations and exundations, therefore a ſuppreſſion of theſe Convulſions by Opiates preſently renders theſe ſmooth and tranquil :) But yet it ſeems alſo probable that the opiatick Particles, whilſt they are poured into the Blood do cauſe certain alterations to its Liquor by their meer ſyncraſie or Commixtion: for we have ſhewed above that theſe are altogether untameable, and immiſcible and heterogeneous to the Blood ; which therefore ſince they appear not Enemies or injurious to its Liquor, may be after a ſort eſteemed for Alexiterians, of the ſame ſort doubtleſs, which being confuſed with the Blood, do quickly and almoſt untouched paſs thorow its Maſs, and by opening all holes and Pores in their Paſſage make an open way for the *Serum* and other ſuperfluities or malignities cloſely bound or ſhut up, to go forth, yea drive them before them out adoors, Wherefore not altogether undeſervedly is it that *Opium* is (as it were an *Alexipharmacon*) put into the Compoſitions of the chief Antidotes as of Treacle, Mithridate and *Diaſcordium*.

By what means Opiatick particles operate on the Blood.

Indeed, tis a ſign that the Particles of *Opium* being eaten are preſently carried into the Blood and ſwiftly paſs thorow its Maſs, becauſe they ſuddenly, after the Medicine is taken, being carryed to the *Encephalon*, procure ſleep and eaſe. Moreover it appears by common Experience that they procure Sweat and move Urine, in ſo much that theſe effects are reckoned commonly to the Virtues of *Opium*. Further that its Particles are not Venomous to the Blood but rather Alexiterian or reſiſting Poyſon may be gathered from hence, becauſe that *Laudanum* is oftentimes adminiſtred with great ſucceſs in the Plague, ſmall Pox, malignant Fevours, yea alſo in divers others : but in the mean time we do not eaſily apprehend thoſe Qualities which ſome attribute to this Medicine of fixing and thickning the Blood ; unleſs perchance it may be ſaid to effect it, for as much as by unlocking its joynting, it cauſes its ſeroſities to be plentifully ſeparated and ſent away, ſo that the remaining Liquor becomes thicker and more Compact.

They quickly paſs thorow the Blood.

And therefore are to be eſteemed Alexiterian.

They move Sweat and urine.

But indeed that Opiatick Medicines do fuſe the Blood and ſometimes after the manner of *Alexitærians* move both Sweat and Urine ſtrongly as I have found it by frequent experience, ſo by the following Hiſtory (which I here add for a concluſion) it ſhall be manifeſted to all. Some time paſt I was adviſed with concerning a certain Gentleman very cacochymick or full of evil Humors, and miſerably vexed with nightly Pains ariſing from the Venereal Diſeaſe being not, or not well cured. I preſcribed many things, but in vain ; becauſe very much abhorring Medicines he would yield to take nothing almoſt beſides a Doſe of *Laudanum* only once or twice a week for the appeaſing his Pains ; ſhortly become Hydropical from an *Aſcites* and alſo an *Anaſarca*, he ſwelled ſo much that he could ſcarce move from one ſide to the other without the help of Servants. In this condition I being at length ſent for to him, and finding him obſtinate for his foretaken Medicines, I made a Prognoſtick that he was not far from Death and that it was certainly to be expected, therefore he ſhould prepare himſelf and his affairs for Eternity. He not much diſturbed earneſtly asked that for his more eaſy dying, he might take our *Laudanum*, before but ſparingly permitted him, at his pleaſure or at leaſt in the Evening alſo : granting it with a certain admonition, I left him and gave him as I thought the laſt farewel. Afterwards he took that Medicine dayly, and dayly increaſed its Doſe ſo that in a ſhort time he had taken an incredible quantity of it. By the uſe of this only Medicine he grew better every Day, and within a months ſpace was ſo well that being free from all Humours and Pains, he had got a Stomach and went abroad. By the aſſiduous uſe of this Opiate his Thirſt before much troubling him went away, and being every Night put into a great Sweat he alſo made plenty of Urine. I might here ſhew many cures of of other Diſeaſes eſteemed deplorable performed only by the benefit of *Opium* ; but this being ſomewhat beſides the matter and tedious, I will only note in ſhort one or two more.

A notable Hiſtory of their ſuch like Efficacy.

Almoſt three Years ſince a noble Woman after an autumnal Fevour fell into a cruel Colick with Vomiting and ſharp pains miſerably afflicting the Members and *Viſcera*. Remedies of every Kind both internal and external being carefully

The ſecond Hiſtory.

ly

Part I.

ly adminiſtred for many Weeks, became uſeleſs, but the noble Lady within twenty Days was reduced to that Languor and extenuation of Body, that there was ſcarce any hope left that ſhe ſhould ever recover again: for being fixed to her Bed and almoſt always without ſleep, ſhe was conſtantly affected with the trouble or egrotation of the Ventricle, caſting back again by Vomit whatever ſhe took either of Phyſick or Food, beſides ſhe was almoſt continually tormented with Pains about the Belly and Loyns, and ſometimes alſo in the Head and Joynts: being ſent for to her, when I had tryed divers Medicines, nothing agreed with her beſides a Doſe of liquid *Laudanum*, which at firſt I ventured to give and that not without fear and caution twice only in a Week for the mitigating her Pains: ſhe deſired at length that ſhe might take that remedy every other Night, and then every Night. And ſo uſing this without any hurt, ſhe obtained at Night a plentiful ſleep and pleaſing enough, and for ſome time an Indolency and eaſie digeſtion of her Stomach, and ſo by degrees gathering ſtrength left her Bed and began to fall to her wonted Aliments; but then ſhe could and would take other Medicines, till at length ſhe was quite well.

The third Hiſtory.

No leſs was a certain Woman of note wont to declare the praiſes of this Divine Medicine being obnoxious for very many Years to moſt cruel Colical Pains. For as often as ſhe fell ſick of that Diſeaſe, ſhe felt intolerable Torments and could be releived by no Remedy beſides *Opium*, wherefore ſhe took every Night a Doſe of it, until the morbifick matter being by degrees taken away, ſhe at laſt became free from all Languiſhment and Pains.

Chap. II.

Of the Harms and Incommodities of Opium, *to which is added Cautions about the uſe of it.*

Hitherto we have ſhown the good of *Opium* and as it were its Angelical Face, together with the manner and the Reaſons of its helping. If the other *Phaſis* of this Medicine as of a turned piece of Coyn be looked upon, it will appear plainly Diabolical; in which we may find out not leſs of hurt and Evil than we did of benefit in that of the former; ſo very much Poyſon is joyned to this Medicine, that by its frequent and familiar uſe we cannot ſecure our ſelves; wherefore as we have declared its benefits, ſo it behoves us to admoniſh you of its harms, ſo that it is with this Medicine as with a Sea Voyage; that the leſs danger and difficulty may be met with, 'tis fit that both the Ports they may run into, and the Rocks to be ſhunned, be well known.

Which and how many ways Opium *is wont to hurt.*

That the uſe of *Opium* hath been ſometimes thought hurtful and evil, we have ſeen by the ſad experience of ſome who have no ſooner taken it but they fell into a perpetual ſleep, and of others who by reaſon of too great or untimely a Doſe of it have ſnatched away their Lives or elſe render it unhappy and unprofitable afterwards, by the hurt of the principal Faculties. Inſtances and Examples of this Nature are every where too frequently to be met with, made by Quackſalvers and Empiricks. I have known ſome who having taken a Pill of *Laudanum* to have fallen into ſo profound a ſleep that they could never be awakned: they have lived indeed three or four Days having their Pulſe, reſpiration and heat well enough, yet not to be recalled to Senſe and waking by any remedies or tortures. However I have obſerved from *Opium* taken by others that they have ſlept moderately only, yea ſometimes little or not at all, and preſently to be worſe as to their pulſe, reſpiration and heat: theſe indeed were wont to languiſh aſſoon as they had taken the Medicine, then to draw their Breath difficultly, and ſo grow worſe and worſe, nor could their ſtrength be reſtored to them by any Cordials but by degrees

degrees lingring they loſt their lives. I have ſomewhere received an Hiſtory of a certain robuſt man killed by *Opium*, who fell into no Sleep but the laſt and deadly, *viz.* Death it ſelf; he preſently upon taking the Medicine, complained of a great weight and coldneſs of his Ventricle, by and by he was affected with a notable *languor* and a ſinking down of all his Spirits, and a coldneſs of the extreme parts, and within four hours complaining that his eyes grew dim and then quite blind, he expired. Part I.

Its Poyſon affects firſt either the Brain or Cerebel.

By this 'tis eaſily gathered that *Opium* does not always deſtroy Life by one and the ſame way, but has obtained at leaſt two chief ways of killing. The Reaſon of one of them conſiſts in this, that the Particles of the Medicine being taken, do firſt and rather affect the Brain; of the other, that they in like manner infeſt the Cerebel or little Brain. As to this latter the buſineſs is according to the following manner; if after the Medicine being taken, it happens by chance that the Orb of the Cerebel be ſo beſet by the narcotick little Bodies, that the outmoſt ſpirits being forthwith deſtroyed, the afflux of the interior towards the *Præcordia* is diminiſhed, and then by little and little cut off; there will be a neceſſity for the heart and the Organs of Reſpiration. firſt of all to flagg in the duties of the vital Function; and then wholly to ceaſe from labour: In the mean time as the ſick being free from an heavy *torpor* do awake, they are well enough in mind, and whilſt they live are perfect in Senſe. But if the opiatick Particles breaking in firſt of all, and with a full charge upon the border or Sphere of the Brain, and its inhabitants are ſtrongly invaded; in ſo muah that by and by the outmoſt Spirits being profligated, alſo all the internal poſſeſſing its middle are greatly overthrown, and leſt they may ſpring up again and recruit anew, their forces are altogether ſuppreſſed, then preſently a deep ſleep or an invincible and perpetual drowſineſs or ſtupefaction follows. In the mean time the Pulſe and Reſpiration continuing for ſome time in a due ſtate.

Beſides theſe kind of deadly ſlaughters which *Opium* ſtill attempts upon humane Life, this Medicine hath obtained very many other ways of hurting, which oftentimes becomes deſtructive to ſome private function or part of the Body. Since 'twill be tedious to rehearſe all the kinds of leſſer harms, which Narcoticks are wont to ſtir up, we will here only ſhew what evils do ſometimes happen from the improper or untimely uſe of it in the Head, what in the Breaſt, and alſo what in the Belly.

It produces Evils in the Head, Breaſt, or Belly.

1. As to the Firſt, it is well enough known that the chief Functions of the Soul, *viz.* Memory, Diſcourſe, and ſharpneſs of Wit, are very often notably hurt by Narcoticks. The frequent uſe of them debilitates the memory in many men, I know one that loſt that faculty wholly by too great a doſe of *Laudanum* taken when in a Fever; then after ſome weeks; when the uſe of it begun to return, he could only remember what was done at a certain or peculiar time, and nothing of what was done before or after. I know ſome to have contracted a ſlowneſs or ſtupidity of wit, and others madneſs by this Medicine. *Hence* (*as* Freitagius *nortes*) *when* Proſper Alpinus *and* Bellonius *write, that the Egyptians and Turks are fed with* Opium, *for getting Boldneſs, Alacrity, and Appetite to* Venus, *they add however, that thoſe devourers of* Opium *although they ſeem to be well in health and not to be hurt with the uſe of it, yet that they are rendred more cold, and that their functions were worſe, and that they appeared almoſt perpetually drunk and torpid, and were made full of Hair ſtupid and inconſtant, now affirming and now denying, ſo that people were afraid to meddle or converſe with them; that alſo it became a by-word, which they objected as a blot one to another: Go thou haſt eat* Opium, *which is no other than amongſt us, when they upbraid any one of Fudling or Drunkenneſs.* Freitag. *lib. de Opio Cap.* 3. The Reaſon of theſe appears plain enough from what hath been already ſaid, *viz. Opium* produces the effects but now recited, for that it aſſaults firſt and chiefly the Brain, and whilſt it there deſtroys or profligates ſome animal Spirits, it perverts many others from their wonted ways of Emanations, and bends them into deuious or unuſuall tracts. But that *Opium* is devoured in a great quantity by the Turks (I may add alſo ſome of our Countrymen having gotten by long Cuſtom, as it were, a certain defence or Armour of proof againſt its poyſon) unhurt, or at leaſt without any danger of life; the Reaſon is becauſe its Particles, although at firſt they are infeſtous and poyſonous to the Spirits, yet by the frequent uſe they at length become more congruous and familiar; even as

In the Head.

How Opium *affects the Turks.*

Part I.

we have obſerved concerning the taking of Tobacco in a Pipe, which when 'tis wont at firſt for a few days, to cauſe a *Vertigo* or dizzineſs, and oftentimes vomiting or purging, yea a cold Sweat with a trembling, and frequent faintings; yet afterwards we take it without any diſturbance, yea at length with great delight. But that a greater doſe of *Opium* ſhould add to them a boldneſs of Mind, ſo that they go to fight undauntedly and with notable confidence, the cauſe ſeems to be that that Medicine by ſtupefying ſomewhat the Spirits renders them aſtoniſhed, ſo that how terrible ſoever the things be that they meet with, to the Senſes they are unmoved. Laſtly, that it is aſſerted that Opiates provoke to Venery, when it ſhould rather ſeem they ſhould ſuppreſs that fury by their extinguiſhing the Spirits: We ſay (if that in truth it has that effect) that the genital humour and the Spirits abounding in it, do not deſcend from the Brain, but is poured forth immediately into the ſpermatick Veſſels, becauſe that for as much as Opiates do hinder or make leſs the *geneſis* of Spirits within the Brain, perhaps they cauſe them to be more plentifully diverted to the genital members.

2. What evils of the Breaſt Opium *produces.*

2. That Opiates are ſometimes hurtful to the *Præcordia* and Breaſt, it plainly enough appears, becauſe they depreſs and diminiſh the Pulſe and Reſpiration; and ſometimes alſo (as we have ſhewed above) cauſe them to grow weak, and by degrees wholly to ceaſe: Wherefore in Fevers where the Blood being greatly depraved, ſeems to have no, or no good *Craſis*, and that it yields to the Animal Kingdom but very few, and weak Spirits only, Narcoticks are almoſt always hurtful, and as it were poyſons, for though in the Plague and in malignant Fevers, whilſt the Pulſe and Reſpiration are ſtrong; Mithridate, Treacle, and *Diaſcordium*, yea *Laudanum* are oftentimes given with ſucceſs: Yet if at any time in thoſe Diſeaſes, and in other Fevers not much malignant, the vital function languiſhes, theſe famous Antidotes are but very ſparingly, but more ſtrong Opiates not at all to be uſed. Moreover, in a moſt laborious Cough, Phthiſick, Pleuriſie, *Empyema*, and in other Diſeaſes of the Breaſt, in every one of them where Nature is ſtirred up, ſuddenly ſo that caſting forth what is troubleſome and grievous to the Breaſt, and urges it with its great endeavour, and alſo where the Organs of Reſpiration being deſtitute of great plenty of Spirits, grow weak, and perform their work difficultly and hardly, we muſt abſtain from *Opium* no leſs than from Poyſon; for in ſuch a caſe Narcoticks increaſe the weight to be removed, and fix it, and leſſen the ſtrength of the parts which ought to remove them away.

3. And what in the loweſt Belly.

3. We have above ſhewed that Opiates do operate within the *Viſcera* of concoction and other parts of the lower Belly, and oftentimes in a various reſpect do bring notable helps, notwithſtanding they are not always ſo benign and friendly to this Region; but as it will be eaſily ſhewed they ſometimes cauſe a great evil. For truly Narcoticks being often taken, are very injurious ſometimes to the principal faculty, *viz.* to the Appetite or deſire of Aliments, (on which depends all nouriſhment, and the Root of Life) for that they very much blunt it, and not rarely wholly deſtroy it: For when the Spirits inhabiting the inrerior Coat of the Ventricle, are ſtupefied or deſtroy by the Opiatick Particles, ſo that thoſe nervous Fibres although empty are no more corrugated, for which cauſe all hunger ceaſes, and food not at all deſired, but that being brought to the Stomach, becauſe being what is given is rather a trouble than delight; it is by and by ſpewed forth again. Moreover, for the ſame Reaſon the concocting force of the Ventricle is often debilitated, and the excretory motions both of this and of the Inteſtines, grow ſluggiſh: For 'tis a common obſervation, that the want of Appetite, and ſlothfulneſs of the Belly, are the familiar effects of an Opiatick Medicine.

From theſe it will not be difficult to draw precepts and medicinal Cautions, about the right uſe of opiatick Pharmacy, which indeed may be done by obſerving theſe four following things, *viz.* Before a narcotick Medicine be adminiſtred, we muſt weigh, 1. What the Conſtitution of the Patient may be. 2. What kind of Diſeaſe it is with which he labours. 3. In what ſtate the Animal Spirits are, in reſpect both of the Animal and Vital Function. 4. And laſtly, in what condition the Blood and Humours are.

Phyſical Cautions about the uſe of Opium.

1. In reſpect of the conſtitution of the Sick.

1. As to the Firſt, when an Hypnotick is required, ſee that the Temperament of

of the Sick, the habit of Body or Indiſpoſition, Cuſtom, kind of Life, do not indicate the contrary. As for example, thoſe who are endued with a moderate ſtature, firm Body and well ſet, hot Blood, lively or quick Aſpect, do better bear this Medicine, and more often take it with benefit; which beſides they may much more ſecurely uſe, if they have been before accuſtomed to it. On the contrary, it agrees much leſs, yea is ſometimes very hurtful to thoſe who are too fat or too lean, likewiſe to thoſe who being of a rare texture have Spirits eaſily diſſipable, or of a more cold temperament, have ſoft and flaccid Fleſh, and that are of themſelves ſleepy and dull, of a ſluggiſh and indocile nature: To which add alſo if that they never had experimented that Medicine before. Part I.

2. The nature of the Diſeaſe is of great moment ſometimes for or contrary to Opiates. In more light affections to make uſe of it (according to *Septalius*) is the trick of a Phyſical Adulator: In the Palſie, *Vertigo*, *Incubus*, or Night-mare, Apoplexy, alſo in the *Orthopnœa* or ſtraitneſs of the Lights, in the Dropſie of the Breaſt or *Abdomen*, in the *Stupor* or trembling of the Members, in very malignant Fevers, and in the paroxyſms of intermitting Fevers, or in the *Criſes* of others, Narcoticks are moſt often interdicted. Beſides in the Cough with much ſpittle and thick in the *Aſthma*, and in all other thoracious Affections with an oppreſſion of the Lungs, and in the Hyſterick and other convulſive Paſſions, they are not to be given but rarely, and not without caution and counſel of a prudent Phyſician. But yet in cruel Headach, Catarrhs, Colicks, Pluriſie, ordinary Fevers, in Vomiting, Dyſentery, in Nephritick Paroxyſms, in Gouts and all kinds of Pains, the opiatick Pharmacy is not only allowed, but is ſought for as the only, and as it were divine *Panacæa*. 2. *In reſpect of the Diſeaſe.*

3. But as often as this is propoſed or is deliberated on, we ought alſo to conſider in what condition the Animal Spirits preſiding in each Dominion are: For if they are already few or oppreſſed, and do not enough expand themſelves; they ought by no means to be any more leſſened or thrown down by Medicine: Wherefore whilſt that the Animal Faculties as to the ſenſe or diſcurſion are not very vigorous, or do not ſufficiently exert themſelves, or when the Pulſe and Reſpiration take the turns of their reciprocations but weakly, or are ſtopped or inequal or alſo more quick or ſlow than uſual, or laſtly, if a *ſtupor* or enervation with an unwonted languiſhment, poſſeſſes the members and motive parts, all kind of Hypnotick Pharmacy is to be avoided: But we doubt not to uſe the ſame, when at any time it is required by reaſon of ſome more grievous Diſeaſes, if that the Animal Spirits according to theſe and the other reſpects be robuſt enough, or are alſo too much expanſed or enlarged, or carried forth above meaſure or become fierce or unruly. 3. *In reſpect of the animal Spirits.*

4. But in the mean time the Condition of the Blood and humours is not to be neglected, becauſe ſometimes the wicked and naughty condition of theſe does altogether forbid Opiates, or permit them to be taken but ſparingly, and with a certain reſtriction: The Blood forbids the uſe of them when it offends either in quantity or quality, or in its *Craſis* or Diſpoſition. As to the former, the bloody *Latex* either ſuperabounds or is deficient; in either reſpect it excludes Narcotick Pharmacy: For in the firſt place, whenſoever the Blood is turging with plenty, and boyling up as in a Fever, it hugely diſtends the Veſſels, and ſo the *Præcordia* do highly labour to drive it about moſt quickly, with ſwiftly repeated turns of *Syſtoles*, leſt it ſhould any where ſtagnate or flow over; then certainly to give a Narcotick, whereby that labour and endeavour of the Heart moſt neceſſary for the preſervation of Life ſhould be hindred; would be the part rather of a poyſoner than of a Phyſician. Wherefore in the *Plethora* or overcharge of Blood, Phlebotomy ought to be uſed inſtead of Opiates. In the ſecond place, no leſs evil proceeds from Narcoticks, as often as in the defect or want of Blood; as after great hemorrhages, long faſtings, or continual ſickneſſes they are adminiſtred, becauſe, when the flood of the Blood is very ſmall, and by reaſon of its exiguity hardly continued, leſt that its *fluor* ſhould be broken off and ſo ceaſe; the Heart ſtrives for or endeavours its quick circumagitation, working with a very nimble Pulſe, as it were, with double endeavours. From hence it is plain to conceive what hurt Opiates will cauſe, which put a *remora* or ſtop to this endeavour of the Heart then ſo highly neceſſary. Indeed for this Reaſon it ſeems to be that we interdict Sleep to women preſently after the Birth of the Child, whilſt the *Lochia* are flow- 4. *In reſpect of the Blood and Humours.*

Part I.

ing down, and to others in a free miſſion of Blood or immenſe Hemorrhage, *viz.* leſt the Spirits in the time of Sleep being called back, ſhould leave the Heart with which it ſwiftly drives about the diminiſhed River of the Blood. Further, ſometimes the Blood offending in quality, or (as I may more properly ſpeak) in its *Craſis*, forbids the uſe of Opiates; becauſe whilſt in a *Cacochymia* or Fever, the Blood being very much ſtuffed with recrements or ſuperfluities, ought to be agitated and more ſwiftly circulated by a greater labour of the Heart, to wit, that the heterogeneous Particles might be overcome and quickly evaporated; the operation of a Narcotick coming between doth ſtop this endeavour of the *Præcordia*, and ſo retards, and ſometimes fruſtrates the luſtration or circulation of the Blood.

As to what reſpects the other recrementitious humours, that are wont to be accumulated within the Ventricle or Inteſtines, theſe alſo ought to be carried away, or purged forth by Vomit or Stool before an Opiate be adminiſtred; for otherwiſe being fixed there they will ſtick more pertinaciouſly. Becauſe the ſplanchnick Fibres being ſtupefied by the Medicine are not irritated as before; neither eaſily go about or lively perform the excretory Convulſions for the expelling thoſe ſuperfluities: Wherefore according to the old Precept, if that there be any thing to be evacuated, let it be evacuated before the Narcotick Pharmacy or Evacuation.

Chap. III.

The Kinds, Preparations, and Forms of Opiates.

After having ſufficiently unfolded the Narcotick Pharmacy in general, and ſhewn the means and the manner of its working, it behoves us next to recount and particularly conſider, both the ſimple and compound Medicines endowed with ſuch a vertue, and ſo to inſtitute a certain Opiology.

The diſtinction of Anodyne Medicines.

Therefore in the firſt place according to the Method obſerved by moſt Authors, we will diſtinguiſh Remedies accounted for Anodynes into two forms, *viz.* as they are ſtronger or weaker: For indeed ſome of them being plainly narcotick do not only compel to a preternatural ſleep, but as occaſion requires indolency, Stupor, and unduly given, not rarely Death. Bnt yet there are other Medicines of this kind preſcribed, which not by ſtupefying or deſtroying the angry Spirits, but by ſtroking and ſoftening them, gently draw and compoſe them to Reſt.

A rehearſal of Narcoticks.

1. They are wont to refer to the former Claſs of theſe (which may only be properly called Opiates or Narcoticks) Poppy both the white and the wild, Henbane, Hounds or Dogs tongue, Mandrakes, Nightſhade, and certain others more venomous; and ſo never to be medicinally preſcribed: But the Roots, Leaves, Flowers, Seeds, and the thickned Juices of ſome of theſe not ſo unwholeſome are made uſe of, and (as we have above ſhown) are often taken with great ſucceſs. But truly ſince each of theſe have ſomething of poyſon mixed with them, therefore they are not indifferently to be preſcribed, now theſe now thoſe, as in other Phyſical Medicines, but only to make uſe of thoſe which are approved of by a ſafe and long experience. Hence at length Cuſtom (from which it is not ſafe to recede without danger to humane Life) hath obtained that Poppy and preparations of it, are the *Baſis* or Complement of almoſt the whole opiatick *Pharmaceutice*, the ſeeds of Henbain, and the Roots and Juice of Hounds Tongue, are put into the compoſitions of ſome Hypnoticks; notwithſtanding as often as we endeavour

white Poppy.

deavour thorowly and alſo ſafely to provoke Sleep, the whole force of the Medicine is placed in *Opium* or *Diacodium*. There will be no need here to deſcribe the white Poppy, out of which theſe are made, nor to ſhew the extraction of the opiatick Juice, or the compoſition of that Syrup, ſince that they are ſufficiently enough declared in the Botanick and Antidotary Books both of the Ancients and Moderns. But what remains for us to do and which is more to our purpoſe, is that we now endeavour to expound the elementary parts of *Opium*, and from thence to ſearch out the vertues both of the *Diacodium*, and the means of their intoxicating. Part I.

The nature and parts of Opium.

The body of *Opium* may as to its conſtitutive parts be better known, and examined whole and untouched, than reſolved ſpagyrically: becauſe if it be diſtilled by fire by reaſon of plenty of impure Sulphur it contracts an horrible *Empereuma* or fiery taſt, and diffuſes a very hurtful ſtink. But yet it is obvious to the ſenſe that ſulphureous Particles do abound in this concrete, which alſo its moſt filthy *Odor*, and its inflammability manifeſtly declare: and although it is equally certain that ſaline Particles are adjoyned to the Sulphur, and ſo this concrete doth chiefly conſiſt of theſe two together with a little Earth, yet of what nature and in what ſtate that Salt ſhould be, cannot be defined; but ſo much we may be able to affirm from the effects that this ſulphureous ſaline Concretion is altogether contrary, and deſtructive to the Texture of the animal Spitrts, which is ſpiritual and ſaline volatile. And indeed it may be gathered from very many inſtances that narcotick force lies hid in the Sulphur with the aculeated Salt (from whence it acquires ſo ſtinking a ſmell) for of this nature are the white Poppy, Mandrake, Henbane, Tobacco, and other Opiates, all which have almoſt alike ſtinking ſmell, and in the ſmelling to them very ungrateful to our Spirits. Moreover becauſe the animal Spirits may be ſomewhat of a divers Texture in various Bodies, therefore Opiates may work more ſtrongly and virulently on ſome than others. The Turks and Egyptians, in whom from an aduſt blood, more fixed Spirits and leſs volatile are procured, eat *Opium* without hurt or at leaſt without danger of Life, the Europians not ſo, who have more ſubtle and purer Spirits. Dogs devour *Opium* in a great quantity without any ſleepineſs or death. A little doſe of it preſently kils a Cat, for that the ſpirits of this beaſt, ſo very ſaline volatile cannot at all endure the narcotick Sulphur. And hence it is that one grain of the oyl of Tobacco being laid upon the tongue of this Animal preſently excites Convulſions and Stupor, to which forthwith death follows. Once I ſaw given to an ordinary Dog ſops of Bread rolled in ʒij of *Opium:* after which growing very ſick he became torpid or rather ſtupid, and drawing his Breath difficultly and laborioufly ſeemed as if he was about to dye, but then within half an hour he eaſed his belly plentifully with the moſt horrid and troubleſome ſtink that ever I ſmelt in my life, and preſently thereupon he became well and lively. But that ſuch a quantity of *Opium* did the leſs hurt to this Animal, perhaps the cauſe may in part be the notably acid ferment of his Ventricle, by which the Particles of the narcotick Sulphur might be ſomewhat broken and overcome; and ſo by reaſon of this Sulphur being very much diſſolved by the acid *Menſtruum* of the Stomach, the highly ſtinking dejection of the Belly proceeded. For it is to be obſerved of other Bodies whilſt that an acid body acts on a ſulphureous, there is excited an ingrateful ſmell: For ſo it is wont to be when *Aqua Stygia* or ſpirits of Vitriol are poured upon the filings of Iron. In like manner alſo when the ſpirits of Vinegar is mixed with an Antimonial *Lixivium*. I might take notice of many others of this kind. But indeed 'tis not to be denied that the Particles of *Opium* do work on the dogs ſpirits which notwithſtanding do more ſtrongly reſiſt the narcotick Venom than the ſpirits of a Man, or of other Beaſts, as it is clear by the Hiſtory but now mentioned; for as much as when the torpor and difficult and diſturbed Reſpiration by reaſon of the ſpirits inhabiting the *Encephalon* being affected by the narcotick began to ariſe, thoſe ſymtoms aſſoon as the narcotick matter was overcome by purging preſently vaniſhed. Beſides I have known the truth of this opinion confirmed more by an anatomical experiment. Many years ago we ſaw about three ounces of the tincture of *Opium* done in Canary tranſuſed into the Jugulary Vein of a little Dog, the vein being cloſed the dog ran about after his wonted manner and ſeemed little or nothing affected or changed; after a quarter of an hour he began to be a little ſtupefied, to nod his head, and at length began to fall into a Sleep, but not permitting

In what the narcotick force conſiſts.

It doth not operate after a like manner in all.

It hurts not a Dog ſo as it does a Cat or a Man.

Some Inſtances of this.

Part I.

permitting him when we had hindred him a while by beating, terrifying, and courſing him about, at length the ſoporous Affection being ſo done away he became whole and lively enough: as it appears from hence, the opiatick Poyſon is ſo overcome either within the *Viſcera* of concoction by their ferments, or elſe reſiſted by the animal ſpirits themſelves, as that it is not always, nor alike in all, either an Hypnotick or deadly.

As to what reſpects the top of the white Poppy with the ſeeds, of which *Diacodium*, Decoctions, Emulſions, and other hypnotick Confections are made, it planely appears that theſe are far leſs indued with narcotick Sulphur then the concrete juice of *Opium*; and what of it is in them is much more pure and innocent. Wherefore we oftner and more ſecurely give Remedies compoſed of this: For it is not fit to make uſe of *Laudanum* unleſs when for the vehemency of Symtoms Diacodiates will do little good. Further as theſe contain in themſelves leſs of virulency, they want not much preparation but being ſimply made by decoction, or Infuſion, or expreſſion, they may be brought into medical uſe: but *Opium* is ſeldom ſo ſimple and preſcribed by it ſelf, but is wont to be corrected and compoſed after a various and divers preparation, whereby it may become a ſafe Anodyne.

Diacodiates.

Preparations of Oplum.

The preparation of *Opium* is either ſimple or with diſſolvers and correctors joyned with it. The way of the former conſiſts almoſt only in this, that its Maſs being ſliced into little flakes is ſo long expoſed to the heat of the Fire or the Sun until the narcotick Sulphur being in part evaporated, the reſt becomes friable and leſs ſtinking: which kind of preparation is wont to be firſt made before others. For whether we would endeavour to get the Tincture, Extract or Confection of *Opium*, firſt this previous operation is dryed and reduced into a powder. Moreover hither ought to be referred its fumigation with Sulphur by the ſame means as we cure Scammony: becauſe the acid vapour aſcending from the common Sulphur whilſt it burns, overcomes or breaks very much the virulency of either of them both of the narcotick and cathartick Sulphur.

The Opiates of the Ancients repeated.

The preparations of *Opium* with adjuncts or rather its Compoſitions, are divers and many; of which ſome were more famous and noted among the Ancients, others among thoſe of latter days. The Opiates of the Ancients chiefly noted are Pills of Dogs Tongue, the *Requies* of *Nicolaus*, and *Philonium*, of the laſt of which there were four, *viz.* Roman, Perſian, (the uſe of which is yet ſomewhat retained) and the *Philonium* of *Galen* and of *Meſue*.

The deſcriptions of all theſe are ſeen commonly in every Antidotary, ſo that there is no need to repeat them here. The reaſon of the Compoſitions of theſe chief Anodynes, although built upon an erroneous foundation, as to the other reſpects is underſtood well enough. For that out of a falſe ſuppoſition that *Opium* being cold in the fourth degree moſt of what they received into their *Philoniums* being hot in the ſame degree, *viz.* Wild Pellitory, *Euphorbium*, white Pepper, and others are added, of the like nature, which truly are not improperly correctors of *Opium*. But yet not as if it were their Heat oppoſes the frigidity or coldneſs of that (becauſe indeed it is not cold but rarher hot) but theſe ſharp biting things being full of volatile Salt, do predominate over the narcotick Sulphur of the *Opium*, and break its virulency.

Laudannms *invented by latter Phyſitians.*

Renodæus of Laudanum.

The Opiates of our Neotericks by reaſon of the Laudability of ſuch a Medicine are commonly called *Laudana*; and becauſe they take away pains, by ſome alſo named *Nepenthes*. About what time theſe were firſt made known, *Ronodæus* very ingenuouſly complains, *that there were a company of falſe Phyſicians ariſen, who for the moſt uſual Pills of Dogs Tongue, gave an opiate Confection called by them* Laudanum, *with which they promiſed not only to reſtore ſleep, but alſo to drive away all Diſeaſes. So much* (ſays he) *has the* Encomium *of this Medicine prevailed with theſe runagates that there is no Empirick, none ſo dull medicaſter or not ſo common a Barter who does not profeſs himſelf a Laudaniſt. Without doubt this cuſtom however evil and moſt pernicious to humane Life is not yet worn out.* For that alſo among our Countrymen there is not only a company but a ſwarm rather of falſe Chymiſts and Quackſalvers; every one of which boaſts of his peculiar *Laudanum*, which they raſhly give in every Diſeaſe and Condition, and if by chance it happens for the ſick to ſleep and wake again, preſently they ſing and are Cock a hoop, when rather they merit the gallows, for that the Pulſe and Reſpiration being overthrown by reaſon

of

of their unſeaſonably giving an Opiate, oftentimes all hopes of the *Criſis* and of the cure is fruſtrated: wherefore it behoves you to be warned whoever hath any regard to his Life, that you diligently beware of theſe unskilful Laudaniſts.

Not only the uſe of Opiates but much more the Invention and preparation of them are to be prohibited to Empiricks, and Quackſalvers: For indeed it is the work of a prudent and learned Phyſitian, ſo to temper their Venoms as that they may not be poyſon,but Antidote. Wherefore *Laudana*'s are not to be admitted into practice unleſs ſuch as are invented by skilful men and long made tryal of; of which ſort there are many extant publickly received and approved of, ſo that there is no need of new ones daily to be deviſed. The more Ancient *Laudana*'s of *Paraſelſus*, *Crollius*, *Quercetan*, *Hartman*, and other famous Chymiſts by them related and deſcribed in many *Pharmacopœas* are compoſed only in the form of an extract; in all which the Tincture of *Opium* drawn forth with a fit *Menſtruum* is the *Baſis* or ground; to which tincture others are added, *viz.* of Saffron, Caſtor, (which *Guianerus* names the *Bezoar* of *Opium*) *Species Diambræ*, and ſuch like; and ſo all being confuſed together are diſtilled in *Balneo*, that the *Menſtruum* being drawn off, the remainder may be reduced to the conſiſtency of Hony, in the finiſhing of which laſtly Pearls, precious Powders, Chymical Oyls, and other things eſteemed Cardiacks are added: The Medicine being ſo made up is given for the moſt part in form of a Pill,

Laudana in form of an extract.

Although theſe ſort of *Laudana*'s are efficacious enough and ſeem to be elegantly compoſed, yet the Neotericks ſomewhat varying the form make their conſiſtence (whereby they may be the better taken in any Liquor) liquid; and alſo for that when any opiatick Pill (not more noted for its benefits than for its Harms) may be a terror to ſome, a doſe of liquid *Laudanum* (if perhaps it ſeems neceſſary the patient refuſing it) may be better hid, and being poured into other liquor may paſs rather for a Cordial than an Hypnotick. And indeed concerning the uſe of Opiates the ſick are ſometimes too much and ſometimes too little cautious, and ſo as they are in one caſe to be warned, ſo in the other they ought to be drawn to it and deceived. For the making the liquid *Laudanum* in like manner as the ſolid the Tinctures of the *Opium* and the adjuncts are extracted one from another almoſt after the ſame way; which being all confuſed and the *Menſtruums* drawn off to the middle, there will remain a Medicine ſplendidly red or bluſhing whoſe doſe is wont to be from ℈ß to ℈j.

Liquid Laudana's.

Concerning theſe two kinds of *Laudana*'s, it is a great matter with what kinds of *Menſtruum* the Tincture of the *Opium* is extracted; ſo that the buſineſs has cauſed great contention among ſome Chymiſts of no ſmall note; whilſt they ſuppoſing it cold uſe the ſpirit of Wine, others on the contrary to bridle the heat of *Opium*, diſſolve it in the ſpirit of Vinegar or in the juice of Citrons: Indeed either *Menſtruum* is ſufficient and are almoſt both alike,ſo it be reduced into an extract; but if in a liquid form there can be no ſolutive of *Opium* better to be met with than the ſpirit of Wine impregnated with the volatiliſed Salt of Tartar. For this moſt readily diſſolves its Maſs, receives a tincture like to a reſplendent Ruby; moreover ſomewhat brings under the narcotick Sulphur and takes away its evil ſmell: Indeed the ſalt of Tartar is the beſt corrector of *Opium*, or rather its Antidote. Hence the opiatick Pill of a certain empirick, in which the diſſolvent of the *Opium* is ſalt of Tartar imbued with the oyl of Turpentine, hath been accounted of no contemptible uſe, there is added to that Compoſition the powder of white Hellebore; but that only as I ſuppoſe they may aſſert ſome Parodoxes, that tamed poyſons become the moſt precious Medicines.

what Menſtruum is moſt fit for the making the Laudanum.

Of late years the uſe of a certain liquid *Laudanum* the Author of which is commonly ſaid to be *Helmont*,hath grown famous: it hath for its *Menſtruum* the juice of Quinces put into a fermentation with Yeſt or Barm of Ale or Beer; when this has extracted the Tincture of *Opium* being dyed with a deep yellow, which being ſtrained and aromatiſed, and drawn off to the half in *Balneo*; then the remaining part is reſerved for uſe, and is this liquid *Laudanum*, whoſe doſe is from *gut.* 15 to 20. The other part by a further diſtillation is reduced into a pilulary form and is given from *gr.* j to ij. That liquid *Opium* I have often given with an happy ſucceſs in dyſenterick Affections: But our liquid *Laudanum* (which we do more often uſe) hath for its *Menſtruum* the tincture of the ſalt of Tartar brought to the higheſt red by long digeſtion; and as the Tincture of *Opium* extracted by this,is the ground

The Laudanum called Helmontian.

of

Part I.

of the Medicine, we add for its complement Saffron, *Castor*, Cloves, and *Lignum Aloes*, the dose from 15 to 25 grops.

Wild Poppy and its preparations.

2. After white Poppy and the preparation of it we shall speak next of the wild or erratick which hath indeed a certain hypnotick virtue but far more gentle and benign than the other; wherefore in some cases it is exceeding convenient, and one may be more secure as to its use. Of this may be had in the Apothecaries shop the Syrup and the distilled Water, which are often given with great benefit in most continual Fevers; and are thought to help in the Pleurisy with a certain specifick force; because truly they take away pains, and by stopping somewhat the Pulse depress the feverish æstuation of the Blood. Further, a tincture is prepared of the flowers of this infused in the spirit of Wine, which is a famous Medicine among the Empiricks and good Women, and esteemed very good against a Surfet. The reason of whose help seems to be, that the spirits of the Wine deliver the contents of the Stomach from putrefaction, and the narcotick virtue of the Flowers provides against the assaulting Fevers.

Dogs-tongue and its preparations.

3. Having finished Meconology or Poppyology; in the Class of Narcoticks follows, Mandrake, Henbane, Cynogloss or Dogs-Tongue, Tobacco. As for the two first because they are scarce at all made use of in Medicines (unless the seeds of Henbane) I shall say nothing; but Dogs tongue breathing an odor plainly soporiferous, openly shews its narcotick Nature, and invites us as it were by the fairness of its form to the taking of it willingly: For it is a very neat Plant, having soft Leaves, and pleasantly flowrishing is crowned with a bright Red and most delicate purplish Flowers: The powder of its Roots was put into and denominated that ancient and famous Opiate called Pills of *Cynoyglos* or Dogs-tongue: The juice of the whole Plant gather'd about the beginning of the Spring being expressed, and depurated by a close and warm digestion, and decanted from its *Faces*, yeilds a clear Liquor and splendidly reddish or blushing like a Ruby. This may be used either for a *Menstruum* for the making up of narcotick Confections, or an Hypnotick Syrup may be prepared of it, or lastly being evaporated it may be reduced into an extract, from which, as out of *Opium*, by fit *Menstruums*, Tinctures and Extracts are gotten.

Tobacco.

Tobacco by right challenges a place among them and brings up the rear of Narcoticks; for although it is not put into their compositions, yet its fume being taken in a pipe oftentimes produces the same effects as they: yea, not only causes sleep it self but sometimes its contrary, waking. I shall not go about to describe the origin or manner of this custom commonly known to every one of every Sex, Age, and Condition, Indeed why I rank it with Opiates is because it doth almost the same thing with our Countrymen as *Opium* with the Turks: to wit, either of them by affecting the animal Spirits after an unaccustomed manner, and by rendring them as it were astonished, dispose them to the doing or suffering of any thing without any great sense of trouble or wearines. Wherefore virtues and effects not only manifold but diverse, yea (as I hinted but now) contrary and repugnant one to another are ascribed to the smoak of Tobacco taken at the mouth after the vulgar way. For it is ordinary said to warm us when chill and cold, also to refrigerate those that are hot, to cause or to drive away sleep, in like manner to extinguish or to excite hunger and thirst: the reason of all which consists in this, that the animal spirits being gently agitated by this *Enthymiama* or inflamed smoak, and as it were provoked into certain dances, they are wholly deaf to the approaches of any troublesome thing; yea whatsoever is hard to be perfomed by them, or to be suffer'd, they do being almost insensible and undisturb'd: wherefore the use of Tobacco (when it may be had) seems not only necessary but profitable for Soldiers and Mariners; for that it renders them both fearless of any dangers, and patient of Hunger, Cold, and Labour. But truly it appears from hence that this greatly narcotick fume is very infestous to the spirits (before by frequent custom it becomes familiar to them) because there is none almost who at the first taking and use of it but suffers great perturbations in his Brain and nervous Stock. For when at any time one is initiated into this dry potation, presently as if he were drunk he is affected with a *Vertigo* and *Scotomia* or dizines in the head, then a cruel vomiting and sometimes purging follows, the feet grow weak or stagger, the hands tremble, the tongue faulters, or speaks at random. Oftentimes also a cold sweat and terrible swoonings follow; the cause of all which is, that the animal Spirits being

The effect of the taking this.

The reasons.

being as it were intoxicated by the narcotick Sulphur, are diſtracted very much in their whole dominion, and are agitated into *Ataxias* or irregularities; not only the firſt and ſecond time, but oftentimes, tis for a very long while after their firſt taking it before they can be able to take the fume of Tobacco without great confuſion of the ſpirits. But aſſoon as this cuſtome becomes familiar and cuſtomary, 'tis grateful, and takes the animal Spirits with ſo great a witchcraft or pleaſing allurements, that ſome had rather be interdicted meat or drink than the uſe of it. The reaſon of which is that this ſmoaking gently awaking or ſtirring up the animal Spirits at any time ſluggiſh and ſloathful, and as it were tickling them, provokes them into gentle and expanſive motions, with which they are wonderfully recreated as with the drinking of Wine.

Part I.

So much for the chief Narcoticks, and their preparations, and manner of uſing of them, all which belong to the ſtock of Vegetables: but that minerals may not be thought to effect nothing, there are ſome who boaſt they have prepared out of their more hard concretes moſt excellent Opiates altogether without *Opium*. *Quercetan* preſcribes a certain *Nepenthe* to be made out of the narcotick Sulphur of Vitriol and from the oyl of the Sun and Moon (or of Gold and Silver) with the tincture of Corals and of other famous Cordials, highly efficacious for the taking away of all pains and languors: The virtues of which Medicine I am ſo far from admiring that I rather think there is no ſuch Sulphur and metallick Oyls, or that in truth there can be little or nothing gotten: Therefore returning to the real and genuine Narcoticks, we will as a complement to the work ſet down ſome of their ſelect forms; which we will digeſt into certain Claſſes according as the Opiates have for their *Baſis* either the Syrup or diſtilled Water of wild Poppy, or *Diacodium* or *Laudanum* extract or liquid or Pills of *Styrax* or of Cynogloſs or laſtly *Philonium*.

The Baſis of narcotick compoſitions.

Take of the water of wild Poppies, of Cowſlip water, of each ℥vj, of the ſyrup of the leaves of Poppies ℥ij, of *Sal Prunellæ* ʒß, mingle it and make a Julep, the doſe is ℥iij or iiij, thrice a day, in a Pleuriſy pains, and watchings without a Fever or any manifeſt cauſe.

1. *The water and ſyrup of red Poppy.*

Take of poppy Water ℥iiij to vj, let it be taken by it ſelf ſometimes twice or thrice a day for the ſame end.

Take of *Diacodium* ℥ß to ℥vj, Cowſlip water ℥iij, Treacle water ℥iij, make a Potion.

Potions.

Take of *Carduus* water ℥iij, *Diacodium* ℥ß, ſpirits of Hartshorn ℈ß to ℈j, make a draught for the provoking ſleep or ſweat.

Take of *Diaſcordium* ʒß, Gaſcoins powder ℈j, of *Diacodium* ℥ij, mingle it, take it in a ſpoon.

Take of *Diacodium* ℥iij, Snail water ℥j, mingle it. Convenient in a Cough, Phthiſick, and the doſe one ſpoonful at the hour of reſt, and if need be, repeat it at midnight.

Take of *London Laudanum gr.* j, of the powder of compounded Claws ℈ß to ℈j, with what will ſuffice of the ſyrup of Cloves, make three Pills to be taken going to reſt.

2. Laudanum *extract.*

Take of *Laudanum gr.* j, of ſtomach Pills *cum Gummi* ʒß, make four Pills to be taken going to ſleep againſt the Colick.

Pills.

Take of *Laudanum gr.* j to jß, of *Diaſcordium* ℈j, make a *Bolus*, in the place of *Diaſcordium* may be added the confection of *Alchermes* or *de Hyacinth.*

Bolus.

Take of *Laudanum gr.* j, diſſolve it in one ſpoonful of Treacle water, add of the water of Cowſlips, ℥ij, make a draught.

A draught.

Take of our liquid *Laudanum* tartariſated *gut.* 20, let it be given in one ſpoonful of *Aqua mirabilis* or Cinamon water or any other convenient Water. It is good in colick pains, nephritick or gouty pains.

3. *Liquid* Laudanum *tartariſated.*

Take of the *Species* of *Hiera* ʒß, of the ſame *Laudanum* 20 *gut.* make four pills to be taken going to reſt, to purge and allay pains in Colicks.

Take of liquid *Laudanum Cydoniat. gut.* 15 to 20, let it be given in one ſpoonful of Cinamon water the ſmalleſt for dyſenterick Effects.

4. *Liquid* Laudanum *quinced.*

Take of the conſerves of red Roſes ℥j, Treacle *Andromach. Confectio Hamech*, each ʒij, powder of red Cloath ʒj, *Laudanum Cydoniat.* ʒij, ſyrup of Coral what will ſuffice, make a confection, the doſe is ʒj, every fourth or fifth hour in very bloody Dyſenteries with pains.

Part I.

5. *Pills of* Styrax.

And of Cynogloſs.

6. Philonium.

An antihypnotick Remedy.

Take of Pill *de Styrax gr.* v to vj, of the milk of Sulphur ℈ß, of the oyl of Aniſeeds *gut.* j, of the Balſom of *Peru* what will ſuffice make three Pills to be taken in Coughs, Aſthmas, &c.

Take of the Pills *de Cynogloſs* or Dogs-tongue *gr.* vj to viij, make two Pills to be taken going to ſleep for the ſame Intentions.

Take of Roman *Philonium* ℈j to ℈ij, conſerves of Cloves ʒß, mingle them, and make a *Bolus* to be taken going to reſt. Convenient in the Colick, in a cold Temperament.

After having ſufficiently explicated the narcotick Remedies, we ſhould next ſpeak of Medicines merely Anodyne: *viz.* which not by profligating or by ſtupefying, but only by ſoftning and by ſtroking do gently compoſe, and flatter into reſt the animal Spirits being any way diſturbed or grown fiere or angry. But it ought to be manifeſt concerning the τὸ ὅτι of theſe, whether there are any ſuch in truth, before we make any diſquiſition of the διὅτι or how they are: For beſides this, that Fomentations, Cataplaſms, Liniments, being outwardly applyed, and Clyſters injected into the Inteſtines ſometimes do allay pains, I have not known any other effect to be performed from thoſe kind of mere Anodynes at leaſt taken inwardly at the mouth: Wherefore it does not ſeem worth the while to trouble our ſelves about the *Ætiology* of theſe to which there is no faith to be given, for the conciliating ſleep or for the allaying of Pains when they are very urgent.

But as we have fully diſcourſed hitherto of Opiates, and of their preparations and ways of operating: according to our former method now ſhould follow to be handled, the contrary Medicines to theſe, or Antihypnoticks, *viz.* which by driving away ſleep too much troubleſome do render us wakeful; had I not fully performed this task formerly in the Pathology of the Brain (where we have treated of the Lethargy and other ſoporiferous Affections and their Remedies) ſo that there is no need to repeat here the ſame again. But ſince that both there and in other places hath been made by us frequent mention of a certain Liquor called Coffee, highly efficacious for the driving away the *Narcoſis* or ſtupefyingneſs; it ſeems not to be altogether from the purpoſe to ſpeak here a little more (than we have elſe where hinted) concerning this Drink and the effects of it, and the reaſons of its acting. It will be from the purpoſe to diſcourſe of its Antiquity, and of its common uſe now among the Turks, and formerly among the Arabians and other Eaſtern People: but that this Drink alſo of late years is brought into cuſtom by our own Countrymen, and that there is almoſt none but underſtands well enough by experience its efficacy and virtue for the driving away of ſleep, we will therefore inquire into the reaſons of this ſo well known and experienced Effect. We have ſaid (in the Chapter of Waking) that the reaſon of it conſiſts in this, that this Drink inſinuates aduſt Particles (which we may find both by our taſte and ſmell that it abounds with) into the blood; and from thence into the nervous Juice, which for that cauſe both by their incongruity and their mobility or unquietneſs, detain the Pores of the exterior Brain continually open, and by ſome other way of fettering them add to the Spirits, laying aſide their *torpor* or drowſineſs, certain furies and provokings by which they are excited to the longer performing of their duties: For indeed to the inducing of ſleep theſe two things are neceſſary, one or the other of which is ſtill firſt or rather for the effecting it. To wit, it behoves the Pores and all the paſſages of the exterior brain or its *Cortex* or ſhell to be ſtuffed very much and filled full, and ſo to be ſhut up by the Liquor, there as it were ſtilled forth and overflowing from the Blood; then beſides for the cauſing of this effect there is need that the animal Spirits excluded from the Pores, and thoſe paſſages, and beſides oftentimes burthened with nutritious and ſerous Particles, being given to Idleneſs, ſhould betake themſelves to the middle of the Brain. Concerning this task requiſite to ſleep there is not ſtill one and the ſame order. For ſometimes the animal Spirits firſt and of their own accord relinquiſh thoſe ſpaces the nervous juice by and by ruſhing into the ſame voyd places; but ſometimes the nervous Humour with the ſerous being more plentifully poured in, the firſt invades thoſe paſſages driving their ſpirits thence againſt their wills and compelling them inwardly.

Coffee drink.

Its effect.

Its Ætiology delivered.

But the operation of Coffee ſeems contrary to both effects. The aduſt Particles highly active and ready being delated into the Blood not preſently after the drinking it, do ſomewhat fuſe its Liquor, the ſerous water being detruded towards the

the Reins and habit of the Body; further they driving towards the brain easily open its Pores which they detain very open with their mobility; then they growing to the Spirits do uncloath them from all other Particles both gravative or nutritious, and so stir them up on every side being light and nimble, and make them to be stretched abroad thorow the whole compass of the Brain freed from any heavy oppletion and obstruction. Part I.

Its benefits and imcommodities noted.

In the mean time notwithstanding, whilst the Spirits being continually and unweariedly exercised after this manner, are deprived of the access and assimilation of the nervous juice, plenty of them are not sufficiently renewed after the wonted manner. Indeed the old veterane Spirits are rendred more agil and nimble, but the supplies of the new ones are diminished. Hence as it easily appears that this drink though most commonly used, and very profitable in some cases, and very medicinal; is to others perhaps very hurtful, or less healthful, Indeed that it is so, not only reason but also common observation every where dictitates, for as much as the great drinkers of Coffee become lean, and oftentimes paralytick and obnoxious to an impotency to *Venus*. The first effect is so frequently and every where known, that I have for that reason only forbid many the drinking of Coffee because it dispose to leanness,

It makes people lean.

For that as the Blood by the excessive and continual use of it is made more sharp and torrid, it therefore becomes less able for nourishment. But as to the Affects of the Brain or nervous Stock, I do frequently prescribe this drink sooner than any thing else for their cure, and therefore am wont to send the sick to the Coffee houses sooner than to the Apothecaries shops.

It dispose to the Palsy.

Indeed in very many cephalick Diseases and Sickness, *viz.* great Headaches, *Vertigo*, Lethargy, Catarrhs and such like, where there is with a full habit of body and cold or less hot temperament and wateriſh blood, an humid brain, but a *torpor* and slothfulness of the animal Spirits, the drinking of Coffee is often taken with great benefit, for continually drinking it wonderfully clears and illustrates either part of the Soul, and dispels all the clouds of each function: but on the contrary, who are lean and of a bilous or melancholy Temperament or have a sharp blood or torrid, a hot brain or animal Spirits too much stirred up and unquiet, ought to abstain wholly from this drink; for that it rather perverts both the spirits and humours and renders themalso weak and altogether unable for the performing their functions. For I have observed many not indued with plenty enough of spirits, and obnoxious to the Headach, *Vertigo*, the Palpitation of the Heart, the trembling or numness of the joynts, to have become worse presently upon the drinking of Coffee, and suddenly to have felt an unwonted *languor* in their whole Body.

PHARMACEUTICE RATIONALIS:

OR, THE

OPERATIONS OF MEDICINES IN Humane Bodies.

The Second Part.

With Copper Plates describing the several Parts treated of in this Volume.

By *THO. WILLIS*, M. D. and *Sedley* Professor in the University of *OXFORD.*



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HOUSEHOLD HOMŒOPATHY

OR

DOMESTIC MEDICINE

AND

OPERATIONS

IN

SURGERY AND MIDWIFERY

THE

PREFACE

TO THE

READER.

SInce firſt I began to conſider the Operations of Medicines in humane Bodies, and their manner of working, and for ſome time meditating upon the entire Subject, at length publiſhed an Eſſay of the Rational Curatory part; I became affected with ſo vehement a deſire of farther proſecuting that Speculation, that in all ſpare hours, (to wit as frequently as I might be vacant from my practice) I could hardly intend or admit thoughts of any other thing: And that not ſo much that I might pleaſe others, as by often turning in my mind, and writing my Meditations of this Subject, I might be better inſtructed to preſcribe to my Patients. For certainly the not duely weighing the Reaſons by which Medicines operate, renders all Phyſick to be Empirical, and to be governed rather by Chance or Fortune than by Advice; and it frequently comes to paſs, that a Medicine raſhly adminiſtred, is but caſting a Die for a mans Life. Wherefore, that I might ſatisfie my ſelf, and practiſe Phyſick (as is uſually ſaid) with a ſafe Conſcience, it pleaſed me to beſtow more labour in the ſearch of the true Reaſons of phyſical Energies and Efficacies. And becauſe in this Treatiſe, we chiefly conſider Medicines, reſpecting certain private parts or Regions of the body, and their proper Diſeaſes, therefore we have endeavoured in the firſt place to perform theſe three things; *viz.* Firſt that a moſt accurate Anatomical Deſcription might be given of the parts, (if not already extant) whoſe diſtempers and remedies are treated of, as to the Fabrick and uſes of all their Veſſels. Wherefore, turning over the Breaſt and Lungs, and moſt diligently viewing their inward receſſes and apartments, what thing ſoever obſervable either the Ancients or Moderns have

publiſhed about theſe, and whatſoever further by Knife or Microſcope we have detected, we have here ſet forth. In which task, as formerly in ſome others of the ſame nature more exactly done, I muſt confeſs I owe much to the ſedulous labour of my moſt learned Friend Dr. *Edmund King*, and to his moſt dexterous Diſſections. And really I eſteem it ſo neceſſary to lay the Hiſtory of the parts, as a foundation to our Rational Curatory Method, that without it I did believe the whole Superſtructure would be meerly phantaſtical and altogether unſtable, or at leaſt unprofitable. For ſurely, either to practiſe Phyſick, or demonſtrate its Operations on humane Bodies, without an exact knowledge of the parts and paſſages, on which, and by which they work, would ſeem equally abſurd, as if a Philoſopher ignorant of Mechanical affairs, ſhould go about to unfold and explicate the Artifice and cunning Workmanſhip of a Clock moving of it ſelf, according to the Theory of Natural Motion delivered by *Ariſtotle*. Wherefore we have view'd with moſt exact diligence, in the firſt place, the Subjects of Phyſick, or the places of Operation in our Bodies, as the Circuit in which we are to move. Then ſecondly we have not been leſs ſolicitous, that according to the Phænomena of all parts lately detected by Anatomical obſervation, the true and real Hypotheſes of Diſeaſes ſhould be built, whereof we have deſigned the Remedies; that not ſtill perſiſting in the thread-bare paths of Ancient Phyſick, by a certain blind and implicite obſequiouſneſs, after the manner of Beaſts, according to the proverb, to be only guided by our Anceſtors footſteps; but deriving the Cauſes and formal Reaſons of Diſeaſes from their very Springs, we every where endeavour to ſhew, from what Diſpoſition of Blood and Humours, from what affection of Animal Spirits, from what habitude of Fibres, and of other ſolid parts, every diſeaſe proceeds. And theſe things ſo premiſed, and laid inſtead of a ſolid Foundation, at length in the third place, that the ſtructure of our Curatory method being rightly compacted, may happily riſe up and firmly conſiſt, we have gathered together moſt of the Medicines reſpecting moſt of the private parts and regions of the body, and the peculiar Diſtempers thereof, *viz.* both Simple and Compound, both Old and New, both Dogmatical and Empirical, gathered out of the Phyſick-books of every Age, as alſo thoſe chiefly celebrated by Quacks and Nurſes; more choice forms of all which, or at the leaſt

leaſt the chief of them, and manner of uſing, we have aptly aſſign'd, and annex'd the reaſons as to the Preparations, as alſo the Operations and Effects of them. But that all is not comprehended in this Tract that was omitted in the former, which yet I had hoped might have been, happens from the plenty of matter, and the bulk of the work encreaſing upon our hands: For aſſuredly, it is more than the task of one Man or Generation, to exhibit a compleat Curatory Method, and abſolute in all points. For if this Diſquiſition were more fully inſtituted as to its Latitude, not only all the *Materia Medica* (which is almoſt infinite) but alſo the whole Body of Phyſick offers it ſelf. Wherefore theſe our Attempts court not the name of Treatiſes, but of Eſſays. Truly it will not be needful for many Phyſicians, eſpecially thoſe who neglect the Phænomena of Nature, being intent only on their Practice and Gain, to be learned about the Reaſons of all Remedies: but to the genuine Sons of Art, this will be of value, if not to direct, at leaſt to incite them to the Knowledge and ſerious weighing always of thoſe things they take in hand. And if theſe ſmall endeavours ſhall inſtigate others better to poliſh that Study, whatſoever Reviling I may reap from the malevolent and envious, it ſhall never repent me of my labour. For when I ſhall be well conſcious to my ſelf, that I have not ſuffered my Faculties although ſmall (as the Talent entruſted with me by God Almighty) to periſh through ſloth, nor ſuffered them to be buryed in the earth, but that they may be rendred with ſome Intereſt beſide the Principal, it will much pleaſe me, nay, I ſhall ſeriouſly rejoyce and triumph.

POST-

POSTSCRIPT.

WHile *these were Printing, the most sad message arrives, that the Author, most worthy of Immortality, oppressed by the irresistible assault of a Pleurisie, is departed from among the Living; neither did the Arts profit their Master, which did all others. The Reader will pardon us, if we for a little space celebrate the Funeral of so Sacred a Memory, nor esteem it superfluous to hear in a few words, what manner of person he was who wrote such things: yea he will rejoyce to understand that he was equally Good as Learned, that he also exercised himself in the Practice of Piety, who was most conversant in that in Physick.*

The matter requires a just Commentary, but we shall briefly propound what at first came into our sudden thought, while our mind was surprized with so unexpected an Accident.

Extracted from an honest Family, he had a Father educated in ingenuous Studies, who after he had gone Master of Arts in the University of Oxford, *being taken with the retiredness of the Countrey, repaired to a Possession he had near the same City, and solely attended his Domestick Affairs, and maintenance of his Family: being enough deserving of the World, who begat such a Son. But He, the Civil War raging, being snatcht away by the Contagion of a Camp-Feaver, left his Son an Orphan, near about twenty years of age, placing the first Rudiments of his Studies in* Christ-Church; *who being called to take on him the care of an Inheritance, for some time remained in the Countrey, but harrased by the Incursions of the Rebels, who were possessed of a Garrison strong enough Five miles from thence, and every where Plundering, he betook himself again to* Oxford, *being the Tents of the King as well as the Muses; where listing himself a Souldier in the University Legions, he received Pay for some years; untill the Cause of the Best Prince being overcome,* Cromwell's *Tyranny afforded to this wretched Nation a Peace more cruel than any War. From thence, the Church being trampled on, and Divinity together with Divines suppressed, he applyed himself to the study of Physick, in which, in a short time he made eminent progress. In the mean time being nevertheless addicted to the study of Piety, (whereof it was a considerable demonstration, that when the Liturgy of the Church of* England *was thrust out of the Church, and none could be present scot-free at those holy Offices after the ancient manner) he entertained Religion then a Fugitive; and allotting part of his House for Holy uses, brought it so to pass, that*

Assem-

Assemblies, and Publick Prayers, and other Offices of Piety were constantly performed according to the Rites of the Church of England. *In the mean time he writ and published those most excellent Tracts by which he first became known to the World,* viz. *Of* Fermentation, *of* Feavers, and of Urines.

At length the King restored, and accesse opened to University Degrees and publick Employs, he proceeded Doctor, and was publickly declared Professor of Natural Philosophy, which Profession he did adorn with the highest praise; Moreover, his Anatomy of the Brain, *and his Treatise of the* Scurvy, *and of* Convulsions, *were published.*

But about the Year 1667. *being called to* London *to practise Physick, it is incredible to relate, how soon, and with how great Commendations he grew famous, especially being so composed by Nature and Custom, that he could not recommend himself by words composed to deceive, or the cunning Arts of Mountebanks. But though he spent whole dayes and nights in care of the Sick, he was yet at leisure to adorn his Art by composing Books, from whence among a thousand Interruptions he published these Treatises, of* the Accension of the Blood, *and of* Muscular Motion, *of* the Soul of Brutes, *of* the Diseases of the Brain, *and the first part of his* Pharmaceutice Rationalis, *and at length the* other *which we now present. All which, with the Authors Animadversions, and writings unpublished, being collected into one Volume, and committed to the care of the most faithful Apothecary Mr.* J. Hemming, *we hope some time to print here.*

Moreover, the same care for Divine Worship was still impressed on this most Pious Soul; and since he could not be present, by reason of Employ, at the Canonical Hours at the Publick Devotion in the Parish Church where he dwelt, he procured the Sacred Offices of the Church to be there celebrated early in the Morning and late in the Evening, and for the most part was constant at them, whatever Business was repugnant. And seeing this Institution profitable to many in the Neighbourhood, who were likewise all day detained about Commerce and Trades, he endowed a Priest with a fit Salary at his Death, to discharge that Function for ever.

But small was this proof of his excellent Pious temper. Although no Person more frugal and attentive to his Employ, yet none more munificent, denying all things to himself, yet denying nothing to the Poor and helpless. Besides what he bestowed with his own hands, he provided Almsgivers and Dispensers of his Charity every where in the City, Countrey, and in the University. I speak what I know by frequent experiment; one might easier have received from him, for a fit object of Charity, an hundred Crowns, than have extorted as many farthings from most others. And though any one might justly impute the large Revenues he acquired, to his indefatigable Diligence and constant Frugality, yet I believe it rather to proceed from his

his bountifull Largesses, and the Divine benediction thereon. From the beginning of his Youth to the last period of his life, he was Master of no summe of Money which he accounted his own, untill he had consecrated some considerable Portion of it to God and the Poor: And when a few dayes before his last, which I must ever lament, we conferr'd together, (as if he had foreknown his approaching Death, and being more solicitous about the Poor than his own Offspring,) he diligently advised about stating these Accompts.

I omit here to decipher, how undisturbed he was in Adversity, and how temperate in Prosperity; how modest in the highest Fame for his Learning; when unworthily provok'd, how prone to forgive Injuries; how faithful to his Prince to his death; how obedient to the oppressed Church; how candid and ingenuous in the Profession of his Art; how indefatigable in his Studyes, how sparing in his Speech, and how much a Christian in the whole state of his Life. To finish all which according to his deserts, is not the work of one hour or Paragraph. In short, he was constantly exercised in Prayers, Studyes, Labours, Almes, and Watchings; at length being near Fifty seven years of Age, in the beginning of November *he seemed troubled with a Cough (now the Epidemical Disease of the time) which (while it was thought light and inconsiderable) suddenly passed into a Pleurisie and Peripneumonia. And when this most expert Person was not relieved by frequent Bleeding and diligent taking of Remedies, himself perceived the Period of his Life to approach, (his Friends hoping better;) and after three dayes his Houshold affairs being settled, and having taken the* Viaticum *of the* Holy Eucharist, *and being received into the Peace of the Church, he commended his pious Soul to God, having his senses entire to the last breath, and finisht his most exemplary Life with the like Death.*

THE

THE SECOND PART OF *PHARMACEUTICE RATIONALIS*, OR OF THE OPERATIONS OF MEDICINES IN HUMANE BODIES.

SECT. I.

Of the Medicines of the Thorax.

CHAP. I.

Of the Organs of Breathing and their Uſe.

The Authors purpoſe in the preſent work.

IN the former Treatiſe having eſſayed to explain the reaſons of every Medicine, for the moſt part we have toucht only upon general Medicines, namely which excite ſome Evacuation, or recreate and reſtore the fainting Spirits, or calm thoſe which are too much raging and unquiet: But moreover there are many other Remedies, and thoſe of ſeveral ſorts, which are ſuppoſed to have reſpect to ſome peculiar part of the Body, or ſome particular Diſeaſe, and to be appropriated to thoſe ends by a certain kind of ſpecific virtue or operation. Now as concerning both the ὅτι and διότι of theſe, at leaſt the chief of them, *viz.* whether it be really ſo, and for what reaſon it comes to paſs to be ſo, it ſeems now worthy to be inquired into: And firſt of all we will treat of the Medicines of the *Thorax*, *viz.* thoſe that are wont to be preſcribed againſt the Cough, Phthiſic, Catarrh, Aſthma, Dyſpnœa, and other Diſeaſes of the Breaſt.

The parts of the Thorax.

But ſince the reaſons as well of theſe Diſeaſes as of medicinal Operations in healing them ſeem very abſtruſe and moſt difficult to declare: therefore before I enter upon this task, ſomething ought to be premiſed about the parts themſelves, as well touching their uſes and ordinary actions, as their ſickneſſes or preternatural affects. As to the firſt, the parts of the *Thorax* are either principal, as the Heart and Lungs, with

with the Veſſels appendent unto them; or ſubſervient, as the Membranes and Muſcles, with the Diaphragma; as likewiſe the Ribs, with the Vertebra's; the Pneumonic Veſſels, with the nervous Fibres and Glandules. The conſideration of the Heart and its Veſſels doth not properly belong to this place, becauſe not ſo much the ſickneſſes of the Breaſt alone as the general ſickneſſes of the whole body are uſually reckoned amongſt its paſſions. Whereas therefore the remedies appointed to cure the diſeaſes of that region, have ſpecial reſpect to the Lungs, and to the other Organs of breathing ſerving them; therefore firſt we will deſcribe the fabrick and uſe of theſe parts, then their diſeaſes afterwards, together with the method of cure, and remedies; and laſtly endeavour to add the reaſons of all theſe.

The ſubſtance of the Lungs altogether membranous.

The ſubſtance of the Lungs was always accounted by the Ancients, and moſtly hitherto by modern Authors for fleſh and a Parenchyma, like the frame of the other bowels; which notwithſtanding was accounted lighter and ſpongeous (for as much as it was apt to be diſtended much by air pufft in, and to float upon waters.) Moreover, whereas the Lungs taken out of an Embryo look red, and ſink in water; and the Lungs of ſome grown perſons being boiled, appear compact enough and more ſolid; almoſt no man doubted but they conſiſted really of fleſh: until lately the renowned *Malpighius*, a moſt diligent Searcher of Nature, found thoſe parts to be altogether excarneous, and meerly membranous; "and therefore he judges the bulk of "the Lungs, if the Nerves and certain Veſſels be ſeparated with the branches of the "*Trachea*, to be a certain heap of little Bladders, and thoſe ſmall Bladders every "where ſtretched out and ſinuous, to obtain ſuch poſition and knitting together, "that an entrance lies open into them from the *Aſpera Arteria*, and ſo from one "into another, until at length they all end in the Membrane incloſing the Lungs. "And truly that it is ſo, he makes clear to ſenſe by an Experiment. For let a Lung "be taken out hot, and let water be ſo often caſt by a Syringe into the Pneumatic Ar"tery, as till the whole frame appear ſomewhat white, and almoſt tranſparent, the "blood being clean waſhed out; afterward this water being ſqueezed out by preſ"ſing, and the air let in by the Wind-pipe, and pen'd in, let the Lung ſo filled be "dryed: and it does not only, whilſt expoſed to the light, outwardly ſhew tranſpa"rent little Bladders; but being inwardly cut, it preſents a white heap of little "Bladders to the eyes. Beſides, having viewed it with a Microſcope, he diſcovered a certain wonderful Net, binding and knitting together every one of thoſe little Bladders; which Net conſiſts of the minute productions and branchings of the Artery and Vein; which Veſſels circulate the blood by the ſmall and crooked paſſages, and by the many turnings of the Pipes.

Conſiſting of almoſt infinite Lobes.

The moſt renowned man hath found out beſide theſe little Bladders for the moſt part conſtituting the frame of the Lungs, a new and more admirable furniture of this Bowel, *viz.* he ſhews plainly the bulk of the Lungs to be blown up by almoſt infinite lobes girt about with their proper Membrane, which being endued with common Veſſels, grow to the ſmall twigs of the *Aſpera Arteria:* the inſertion and ſituation of which kind of little Lobes are manifold, as being ſometimes affixt to the Baſis of the *Trachea*, ſometimes to the Ribs, or to its Cone; alſo according as they end in the outward and plain ſuperficies, or in the corners of the Lungs; and according as they ought to have a due poſition, knitting and inter-ſpaces among themſelves, rightly to fill up the frame of the Lungs. The little lobes out of which each lobe of the Lungs is made up, in the third Table are accurately and to the life expreſſed.

Their little branchings.

Certain inter-ſpaces diſtinguiſh theſe little lobes (which manifeſtly appear in a larger Lung or in any other half boiled) which (as the renowned Perſon hath obſerved) are not bare cavities or empty ſpaces, but they have many Membranes ſpreading from the little lobes, ſome parallel, ſome angular, and are alſo covered with many Veſſels, ſo as theſe inter-ſpaces are certain membranous little bladders, yet tranſparent and moſt thin. If you lightly open in one ſingle lobe of the Lung one of theſe inter-ſpaces with the point of a knife, and ſhall blow into it by a ſmall hole through a Pipe, preſently that whole lobe will be very much extended, every inter-ſpace being pufft up; and then if you bring this frame to the light, the inter-ſpaces being made tranſparent, do ſever by great intervals every lobe very conſpicuous; and ſo every rank of the lobes will appear like a Polypody-leaf, and under the ſame figures, as *Malpighius* hath deſcribed, and are repreſented in Fig. 2. of our third Table. But when the little lobes are filled and extended by liquor eaſily congealing caſt into

into the paſſages of the *Trachea*, the appearance thereof is ſomewhat diverſe, and ſeems in the form of Grapes, as is expreſſed in Fig. 1. of the ſame Table. The Veins and Arteries every where accompany this production of the *Aſpera Arteria*, and extend themſelves through the whole ſubſtance of the Lungs by a certain knitting and alike branching. This is plainly perceived by a pleaſant ſight, in a lobe of the Lungs being emptied and turgid, Quick-ſilver being caſt into ſome of the Veſſels, and others filled with a coloured liquor. But in diſſecting the living, another ſort of Veſſels, *viz.* Lymphæducts are manifeſt to the eye to be ſpread through the whole Lungs: and we have in another place clearly enough ſhewn, both very many Nerves and nervous ſlips every where to be diſtributed through them. Beſides theſe parts, and the primary or chief veſſels of a Lung, ſome others, and thoſe as it were ſecondary, are to be obſerved. For the Pneumonic Veins and Arteries are endued with other ſanguiferous Veſſels ſpringing from the *Aorta*, moreover with Glandules, and likewiſe with Fibres as well nervous as moving; and the Wind-pipe is endowed with every one of theſe, and cartilaginous ones beſides.

The Lymphæducts and nervous ſlips.

Whence we may infer, that the entire frame of a Lung is meerly fiſtulous, and compacted of Pipes of ſeveral kinds and magnitude, and variouſly and moſt intricately diſpoſed: which although they may appear wonderfully complicated, and many ways twiſted and wreathed, are yet every where continuous, and being ſtretched out with a mutual reſpect to one another, do hither and thither in good order and regularly convey and diſpoſe the air, the blood, the *Lympha*, and animal Spirits for ſome acceſſary uſes. To deſcribe as it were with a Pencil this bulk of a Lung, together with the branchings, ſeparatings, and mutual complications of all its Veſſels, would be no leſs difficult a task than to trace the ſeveral threads of a harl of ſilk, and their reſpect one to another. Nevertheleſs, that both the Pathology of the *Thorax*, and the cure, may be duly known according to our deſign, it ſeems to be material to recite here all the Veſſels of the Lungs one after another, and to deliver as well their deſcriptions, as their preternatural uſes and diſeaſes, to which at length the Therapeutic Method ſhall be ſubjoyned. And theſe are the Veſſels of which the entire fabrick of the Lungs conſiſts, the Wind-pipe, with the *Bronchia* and little Bladders, Arteries, Veins, Lymphæducts, and Nerves, to which may the parts and appendices of thoſe Veſſels be added, *viz.* the Coats of the greater Veſſels, which are endued with other ſanguiferous Veſſels and Glandules, and alſo with nervous Muſcles and Fibres.

The Veſſels of a Lung.

Therefore as to the chief Veſſels of the Lungs, although all theſe, by reaſon of their mutual offices, communicate among themſelves with a wonderful affinity; yet the Arteries and Pneumonic Veins attend on the *Trachea* and its partitions the moſt exactly; for the branches and ſprigs of every one of theſe ſpringing alike from their reſpective ſtocks, and ſtretcht out to and fro, go on every where with like pace; ſo that the *Trachea* and its branches are always in the middle, above that the Vein, and beneath the Pneumonic Artery are carried, and all are diſtributed with an equal and ſociable branching: and the ſprigs and branches, ſent from each of them, are preſently applied to their like, and are interwoven like wonderful Nets, of which the texture of the Lungs is almoſt totally conſtituted. It will be impoſſible to deſcribe the ſpreadings out and various complications among themſelves of all theſe going on together, as to the leſſer ſprigs and ſlips; yet if you will caſt into every veſſel apart Quick-ſilver, hot and flowing Gypſum, Wax mingled and made liquid with Oyl of Turpentine, or ſome ſuch matter, which will extend all or the chief paſſages, and continue them ſtufft, then you may exactly enough repreſent the figure: and after that manner the frame or texture of the whole Lung may be conceived, each being deſcribed by it ſelf and apart. Wherefore upon theſe and all other Veſſels and parts of the Lungs we will treat in order; and firſt of the *Trachea* or Wind-pipe.

wait on the Trachea.

The Wind-pipe or *Aſpera Arteria* is a Pipe ſomewhat long, conſiſting of Griſles and Membranes, which beginning from the Throat or loweſt part of the Jaws, and leaning on the Gullet, and deſcending into the Lungs, is diſperſed by manifold little branchings through their whole frame. It is divided into two parts by the Ancients, *viz.* the upper, which is called the *Larynx*, and the nether commonly called *Bronchus*; to which a third or loweſt is added, by *Malpighius* called *Veſicularis*, or the bladdery one.

The deſcription of the Trachea.

The former of theſe, which is the beginning of the *Aſpera Arteria*, doth chiefly ſerve

The deſcription of the Larynx.

ſerve for vociferation or loud noiſe, formed of many and various Griſles, to which alſo are adjoyned proper Muſcles; the deſcription and uſe of all which are ſo exactly delivered by Anatomiſts, that there is no need of dwelling longer on the deſcription: we only advertiſe for methods ſake and by way of abridgment, that the Larynx contains ſome greater Cartilages of divers forms, and ſome uniform; the former, by reaſon of reſemblance, bear the denomination of *Epiglottis*, the Buckler-like Cartilage, the Ring-Griſle, and ἀρυταινοειδής. To this laſt doth ſucceed a continual rank or row of Cartilages, faſhioned altogether after the ſame figure and manner; every one of which, whereas they reſemble a circle, but not compleat, are diſpoſed after ſuch a ſort, as if one ſo compoſe many wooden Rings, that there ſhould grow up from the ſides of them, by laying a good many one upon another, a certain Pipe as it were with Ribs. Theſe circular Cartilages are equally diſtant one from another in their whole paſſage, and are knit together by the benefit of an inner Membrane (which fills up the ſpaces between like the *Perioſtium*) as with a ligament. But the hinder part of every Ring-like Griſle where it lies upon the Gullet, that it may ſerve better to the ſwallowing of meats, turns into a Membrane, which altogether is the ſame, and binding together thoſe cartilaginous rings, and covering the whole hollowneſs of the *Larynx*, is always moiſt with an unctuous humour, by which it may as well be defended againſt the ſucking in of ſharper air, as breathing out more acrimonious vapours.

Membranes encompaſſing the wind-pipe.

Beſides this inner Membrane, alſo another outward, though thinner, encompaſſes the whole Wind-pipe, by the aid whereof both the Cartilages are more firmly knit among themſelves, and the whole Pipe bound to its neighbouring parts, and deſcends more ſafely and ſtrongly into the Breaſt. Beſides, we judge there are ſome other uſes and offices of either Membrane, than that it only ſerve to faſhion or defend the ſides of the Wind pipe: for as much as we do here manifeſtly obſerve many Nerves and nervous ſtrings every where inſerted, and alſo the more inward Coat of the *Aſpera Arteria* to be endued with Fibres, as well nervous as fleſhy or muſculous: from whence we may conclude the Wind-pipe to injoy both a certain ſenſe and motion either in the whole, or at leaſt in ſome parts. And truly it is manifeſt even to common obſervation, that its more inward paſſage doth excel with a moſt acute ſenſe; for as much as it is ſo much provoked by the ſmalleſt prejudice, that preſently it is wonderfully forced into a convulſive motion, *viz.* a Cough: but as a ſenſe of annoyance, and from thence very often an inſtinct of motion ariſes from this Veſſel; ſo we think that its Fibres do after a ſort move of themſelves both in breathing and coughing. Surely in reſpect of this it is not to be doubted, becauſe in this inner Membrane we find two orders of muſcular Fibres in that faſhion diſpoſed as in the *Aorta* and Inteſtines: to wit, there is one upper order of ſtraight Fibres, which while they are contracted, make all the circular Cartilages to be drawn together nearer to one another, and for that cauſe to abbreviate the Trunk of this Veſſel according to all its parts ſucceſſively. Under this lies another order of circular Fibres, which (while they are pufft up) being contracted, the hollowneſs of the Wind-pipe is much narrowed. Therefore when the moving Fibres of either kind make the paſſage to be ſtraitned according to all its dimenſions, it is obvious enough that they conduce to the diſcharge of the function of breathing, and more or leſs to be active, as there is endeavour to breathe quicker or ſlower, more intenſly or more remiſs. Theſe Fibres being more vehemently contracted in a Cough, in hawking, in blowing out, and certain other more ſtrong exerciſes of expiration, do force the breath and other contents of the *Aſpera Arteria* to be violently expelled. Moreover from this action ſometimes either depraved or hindred, it ſhall be declared hereafter how an Aſthma, a Dyſpnœa, and ſome other diſeaſes about breathing do ariſe.

The glandulous and vaſculous Coats.

This inner muſculous Coat hath alſo two others, as if growing thereunto, to wit, one glandulous, and that full of veſſels. For as in another place we have remarked about the Anatomy of the ſanguiferous Artery, one may alſo here take notice, that the inward Pipe of the Wezand is covered with a moſt thick weaving of Veſſels of every kind, and eſpecially of thoſe carrying blood, in faſhion of a Net. The Arteries not ſpringing from the Pneumonic Veſſels, but from the Bronchial branch (which the moſt renowned Mr. *Ruiſch* diſcovered to have its riſe from the *Aorta*) are inſerted into this ſame; which the veiny ſlips do accompany, owing their origine to the *Vena cava*. The nervous ſprigs meeting theſe two, are variouſly folded; and ſo of all weaved together, is framed as it were a little Net, covering the whole back of the Wea-

Weazand, under which folding of Veſſels very ſmall and whitiſh Glandules are every where ſtrewed, or rather cleave to them; juſt in the like manner, as we have in another place ſhewn to be in moſt other greater Veſſels, and in all membranous Bowels: on all which the Lymphæducts adjoyned do wait. As to the uſe of theſe, without doubt the Arteries and Veins waſh through the Pipe of the Weazand with bloody ſtream for its nouriſhment; and the Nerves carry plenty of Spirits, and the faculty of performing motions to the muſcular Fibres. Afterwards whatſoever of ſuperfluous moiſture be left by the Arteries, that the Veins cannot bring back, the Glandules do receive and retain, until it may be ſent back to the maſs of blood through the Lymphæducts. When they are too much filled, by reaſon of the Lympha more plentifully left, a humour diſtilling from the Glandules as well as from the Arteries into the hollowneſs of the Wind-pipe brings a Catarrh. All the Coats of the *Aſpera Arteria* diſtinct and ſeparated from each other are expreſſed in the ſeventh Table.

Of the Bronchia.

The ſecond part of the Wind-pipe, commonly called *Bronchos*, begins from the entrance of the Lungs: for near the fourth Vertebra of the Cheſt that great Pipe deſcending, is divided into two Trunks, one whereof goes towards the right ſide of the Lungs, the other the left: afterwards both having entred the Lungs, and being ſubdivided for the greater Lobes, diſtribute very many ſprigs (as for the moſt part in the gills of fiſhes) to the Lobes or leſſer Lobes through the whole frame of the Lungs. The paſſages of all theſe are furniſhed, even as in the Larynx, with Cartilages, but framed ſomething in a differing manner: for in the *Bronchia* theſe are not Ring-like, but reſembling a Coat of Male, ſo that when there is need to contract thoſe paſſages, the inferiour Cartilage goes under the hollowneſs of the upper, almoſt in the ſame manner as it is in the joynts of the ſhelly Coat of a Lobſter. Proviſion is ſo made by the work of God, that when the Lungs are dilated, the *Bronchia* are ſtretcht out into the greateſt length; and when they are contracted, the *Bronchia* are abbreviated, one part being drawn into another.

Their Syſtole and Diaſtole.

The Coats of the *Bronchia*, as alſo of the Larynx, have muſcular Fibres of both kinds, together with the Glandules and the Net like twiſting of Veſſels: from whence we may alſo conclude, that all the leſſer Pipes of the *Aſpera Arteria* have their conſtant turns of Syſtole and Diaſtole, *viz.* all the Pipes are contracted while we breathe out, and relaxed while we ſuck in air: moreover from the ſame Glandules and little Net of Veſſels every where continued almoſt within every inward receſs of the Lungs, doth diſtil the Catarrh humour. A certain Bronchial branch of the *Trachea* belonging to each Lobe of the Lungs is deſcribed in the ſecond Table *H. H.*

The Lobes of the Bronchia.

And the branched *Bronchia* of both ſides not only conſtitute two or more greater Lobes; but, as *Malpighius* hath obſerved, many leſſer or little lobes diſtinct among themſelves; for each Bronchial branch ſends forth to and fro many little branches or twigs, every of which twigs being joyned with alike twigs of the Pneumonic Artery and Vein, from thence are parted into innumerable leſſer ſprigs; all which being every where fellowed and complicated among themſelves, and having got Nerves and peculiar Lymphæducts, and ending in the outward ſuperficies of the Lungs, repreſent as it were a certain private Grove; and ſo the whole ſtructure of the Lungs conſiſts of many little branches of the aforeſaid Veſſels complicated, as it were of ſo many ſeveral Groves. The branches whereof and outmoſt ſides of which, although they may ſeem mutually to touch themſelves and cleave together, yet they are disjoyned one from the other, and are every one bounded within their proper limits; far otherwiſe than the productions and communications of Veſſels are in the Brain, where the Arteries and Veins riſing up in its ſeveral corners, extend on every ſide, and creeping through its whole ſpace, and mutually inoſculating, do all communicate among themſelves.

Their little branchings disjoyned from one the other.

The uſe of the aforeſaid frame.

That former faſhioning of the Veſſels hath been very neceſſary to the uſes of the Lungs; for ſeeing the air ought only to enter the Lungs for that end, that it might pour out to the blood nitrous particles for its flame and vitality or life, and preſently return back; and ſeeing the blood doth paſs through the Lungs for that cauſe, that it might meet the air ſuckt in according to all its parts; therefore it behoves that both theſe, *viz.* the air and the blood be divided into ſmall portions, and with theſe make every where diſtinct and ſhort meetings. The manner of this is moſt elegantly perceived in the gills of fiſhes; for ſeeing the *Bronchia* are as

ſo,

ſo many greater Lobes, every one of theſe is divided into many rundles, furniſhed with a complication of every kind of Veſſels, as if it were into ſo many Lobes; in every one of which the blood is drawn out by minute portions, as it were little rivulets, that it might throughly meet with the nitrous particles, and afterwards return into its chanel.

The uſes of the little bladdery Cells.

The Bronchial Pipes lead into the utter cavities, *viz.* into the numerous little Bladders diſcovered by *Malpighius*; which truly are certain continued parts of the *Aſpera Arteria*, but diſtinct from the former, becauſe the Griſles are wholly wanting to them, and, which ſupply the turn of theſe, are diſtant one from another in larger ſpaces: for all the Bronchial branches ſend forth leſſer ſlips from themſelves every way; whoſe paſſages, although void of Griſles, notwithſtanding are ſtraitned as it were with certain ligaments at certain intervals; and the ſpaces between theſe being filled with air ſuckt in do make partly thoſe ſmall bladdery little Cells. In truth thoſe paſſages may not unaptly be compared to the Gut Colon of a Mouſe, whoſe continued hollowneſs in as much as it is girt about in divers places, ſeems to be divided as it were into many little purſes. Moreover thoſe bladdery paſſages being ſhorter on either ſide the *Sinus* or hollowneſs, have as it were particular little Bladders growing thick to them, and therefore the heap of all the Cells ſeems not much unlike to a bunch of Grapes. The Figures of theſe as much as may be are exactly repreſented in the third Table. Thoſe little bladdery Cells, that they may put forth their contracting endeavours for breathing, have muſcular Fibres, as is plainly ſeen by the Microſcope. For as much as great plenty of air ought to be drawn within the Lungs, and reſerved in part, leſt it fail at any time; therefore beſides thoſe upper paſſages which are as it were the threſhold and dens, moreover more inner chambers and capacious are required, in which the air may be treaſured up, and from thence be diſpenſed upon occaſion. For it ſometimes happens the external is too ſharp, or otherwiſe diſagreeable to the Lungs; ſo that as it was greatly neceſſary that it ſhould be ſuckt in more ſparingly, and its vehemence preſently be attempered and rebated by the air treaſured within. Moreover it cannot be drawn in or inſpired otherwhile in quantity great enough, as in running, ſinging, or much ſpeaking, alſo in ſome crazy diſpoſitions; and in that caſe the inward air being rarified, ſupplies in a manner the defect of the outward.

Endued only with muſcular Fibres.

Therefore ſeeing thoſe bladdery little Cells receive a greater ſtock of air than that they can be bound preſently to return it all by every turn of expiration; therefore the griſly twigs are wanting to them, and their hollowneſſes are more large of themſelves, that they may be more largely diſtended: but that they may puff out a greater quantity of air upon occaſion, or throw out matter to be coughed out, being endued with muſcular Fibres, they contract themſelves more narrowly, and throw out what is contained within them thoroughly. For the ordinary Syſtole's of the Breaſt, which the relaxation of the Muſcles do partly effect, caſt out perhaps at every turn the whole air from the *Trachea* and *Bronchus*, but not from the little Bladders: for the emptying of theſe as often as need ſhall be, both the cavity of the whole Breaſt is very much ſtraitned, and the ſmall bladdery Cells themſelves are ſtraitned from their proper Fibres being drawn together.

The deſcription and uſe of the Pneumonic Artery.

2. The next Veſſel is the Pneumonic Artery, of whoſe moſt thick branches extended every where to and fro, and with other branches twiſted and complicated together, the frame of the Lungs conſiſts. This Artery iſſuing from the right *Sinus* of the Heart, and inclining towards the *Trachea*, is parted into a right and left branch; which applying themſelves to the like parallel branches of the *Trachea*, do accompany them every where, or rather are ſet under them; for they are planted beneath, and are firſt carried into the greater lobes of the Lungs, and afterwards into all the leſſer lobes: in every of which the little branch of the Artery ſtretched out, ſends out on either ſide more ſlips from it ſelf, which preſently are aſſociated by other bronchial and venal ſlips, and are ſeveral ways complicated; and where the outmoſt ſprigs of the *Aſpera Arteria* depart into circular little Cells, the Arteries being complicated with the Veins (as is diſcovered by the Microſcope) do girt about thoſe little Bladders with their thick branching, and enwrap them like Ivy: from whence we may conjecture, that it is not for nothing that the Blood-veſſels that are any where in the Lungs, do curiouſly wait upon thoſe of the air, and every where inſinuate and intimately mingle themſelves. Surely whatſoever hath been ſuppoſed by others, I ſhall not eaſily believe that this is done for the more exact

mingling

mingling of the Blood and its parts, be they never ſo unlike. For to do that, what need would there be of ſo full an acceſs of air, which in rightly making other mixtures (the more perfect whereof are called Digeſtions) we ſeek as much as we can to keep out? For if the air might freely come and go, the Particles that ſhould be mixed, would moſt of them flye away. And as to that which is affirmed, That the Blood in the Lungs is carried through thoſe ſmall, winding and extreme narrow paſſages only that it may be the better mixed; I ſay, that its being ſo carried is quite contrary to ſuch an intention: for the beſt mixture of any liquor (as alſo of the Blood it ſelf) is made by fermentation; and the liquour to be ſo mixed or fermented, like Wine in a Hogſhead, requires a free and ſpacious room: but its going through theſe ſmall and narrow paſſages like ſo many ſtrainers, ſerves rather for the ſeparation than the mixture of its parts; wherefore unleſs the Blood be exactly mixed in the greater Veſſels, and be there rightly fermented, it does, while it paſſes through the Lungs, leave there the dregs and whatſoever parts are not rightly mixt, and ſo does ſtuff up and very much obſtruct their paſſages; as we may ſee in perſons affected with the Green-ſickneſs, Cachexy, and that ſort of Dropſie called *Leucophlegmatia*, who all have a difficulty of breathing, by reaſon of dregs of the ill-mixt Blood that are left there. Wherefore the uſe of the Lungs ſeems to be this, That the Blood through the leſſer Veſſels, as ſo many rivulets, may as to all its parts lie open to and meet with the nitrous Particles of the Air, and be by them enlivened and accended. The Pneumonic Artery, as alſo the *Aorta* and Wind-pipe, hath a muſcular Coat furniſhed with two ranks of Fibres, namely ſtraight and circular; which doubtleſs, when they are contracted, do make the Pneumonic Arteries to beat, and the Blood to be urged and driven ſtill more and more forward. A great many Glandules with a Net of Veſſels lie on this muſculous Coat. The frame and branching of the Pneumonic Artery in ſome one Lobe of the Lungs are expreſſed in the ſecond Table. All the Coats of this Veſſel are drawn diſtinct and apart from one another in the ſixth Table and firſt Figure, and alſo in the fourth Table and ſecond Figure.

The deſcription and uſe of the Pneumonic Vein.

The Pneumonic Vein, having its riſe in the left Ventricle of the Heart, and being divided and variouſly ſubdivided firſt into greater branches, and then, according to the greater and leſſer Lobes of the Lungs, into leſſer, and laſtly into the leaſt of all, is carried above the Weazand, and as it goes on does exactly anſwer to the branching both of the Pneumonic Artery and the Weazand, and goes every where with them as it were cheek by joll; and where the Weazand ends into the little Bladders, the Veins being twiſted with the Arteries (as was ſaid before) do make as it were a little Net wherein thoſe little Bladders are encompaſſed. The Anatome of the Pneumonic Vein differs little or nothing from that of the *Vena cava* and its branches. All the Veſſels of this kind have four Coats diſtinct from one another.

1. The outmoſt of theſe Coats conſiſts of Fibres that ſeem to be nervous, which perhaps are after a ſort muſcular and are extended ſtraight long-wiſe, (though in no very regular order.) This Coat of the pulmonary Vein is very laxe, and looſe from the reſt of the Veſſel, inſomuch that it may all of it be blown up and very much extended, as if it were a diſtinct Veſſel: Whence one might ſuſpect that this were a peculiar paſſage to carry back *Lympha* or *Serum* ſeparated from the Blood: but it ſeems to be more probable, that this outmoſt Coat is therefore made ſo looſe, that the paſſages might be much diſtended and widened for the return of the Blood now hot and boiling.

The uſe of the venous and vaſculous Coat.

2. 3. Two other Coats (common both to a Vein and Artery) *viz.* the vaſculous, and the glandulous lie under this: the office of the vaſculous is to bring nouriſhment to the part, and of the glandulous to receive and ſend away the ſuperfluous ſeroſities.

The muſcular Coat.

4. The fourth and inmoſt Coat is plainly muſcular, having Ring-fibres, as the like Coat of an Artery hath, which certainly being ſucceſſively contracted after the ſtream of Blood, do cauſe its return to be haſtened, and on occaſion to be ſhortned.

Why there is no Pulſe in the Veins.

But here ariſes a doubt, wherefore, ſeeing the Veins as well as Arteries have contracting muſcular Fibres (which in the latter are pulſifick) and ſeeing both are alike joined to the Heart that beats continually, the Veins as well as the Arteries ſhould not ſtatedly beat according to the conſtant turns of the Syſtole's and Diaſtole's in the Heart? It may eaſily be anſwered to this, *firſt*, that the Arteries have a great deal more of the moving Fibres than the Veins have; and therefore whereas *thoſe* being

being ſtrongly contracted ſucceſſively, do force the Blood along as if driven with a wedge, for *theſe* it ſufficeth that whilſt they are gently contracted behind the ſtream of Blood, they calmly and equally drive it forward, flowing back again of its own accord, and as it were down-hill. But *beſides*, the reaſon hereof ſeems to depend ſomewhat on the unlike or rather inverted conformation of the Veſſels; for the Blood conveighed by the Arteries is driven ſtill from wider to narrower ſpaces, and therefore going along it every where violently diſtends them, and lifting up the ſides of the Veſſels raiſes the Pulſe; becauſe whiles that part of the Artery that is behind the Blood is contracted by its muſcular Fibres, that part which is before it, muſt needs beat being filled with the ſtream of blood guſhing in: but on the contrary, the blood in the Veins returning to the Heart, runs out of leſs into greater ſpaces, or out of rivulets into a more capacious and deep chanel, and therefore glides along ſilently and without the fluctuating of a Pulſe.

The diſpoſition of the blood in the Pneumonic Veins.

The blood in the pulmonary Veins ſeems as much, or more than that within the Arteries to be animated or inflamed anew by the air inſinuating it ſelf every where from the Pipes or little Bladders of the *Trachea*, becauſe in thoſe Veins 'tis firſt changed from a black-purple to a ſcarlet: the reaſon whereof is, becauſe the blood at the extremities of the Veſſels, namely as it paſſes out of the Arteries into the Veins, does every where and moſt of all meet with the particles of the air. And for that reaſon it is, that if any liquour be ſquirted into the Pneumonic Artery, it will not ſo readily and quickly paſs through the Lungs and return by the Vein, as it will do if you make the ſame experiment in any member, or part of the body beſides; yea part of the liquor ſo injected will ſweat through into the Pipes of the *Trachea*, or the ſpaces between the little Lobes, and another part, being turned into a froth, will return very ſlowly by the Veins: which is a certain proof, that while it paſſes through the Lungs it makes a ſtay in the mouths of the Veſſels, and is mingled with the airy particles. The Circulation of the blood through the Lungs hath ſomething diverſe from, or rather contrary to that which is made through the reſt of the body; ſeeing the Pneumonic Arteries contain a black-purple blood, and the Veins a ſcarlet, whereas in all the body beſides the branches of the *Aorta* carry a ſcarlet blood, and thoſe of the *Vena cava* a black-purple. Beſides we may obſerve of the pulmonary Vein, that it does every where in its whole length want valves, except where 'tis faſtned to the Heart. Which appears by this, that when any liquor is injected into its trunk (juſt as it is in the Artery) it preſently paſſes through all its branches without lett. Which ought to be ſo, to this end, that the blood may always, becauſe of the violence of the paſſions, freely every way fluctuate and regurgitate in and about the Heart. Beſides, that the left Ventricle of the Heart might never be overcharged with the blood impetuouſly ruſhing into it, by the inſtinct of Nature the Fibres at the root of the Vein being contracted, its courſe might be inverted and flow back. The deſcription of the Pneumonic Vein as to its utmoſt branching is in the fourth Table and third Figure.

The Lymphæducts added to the aforeſaid Veſſels.

To theſe three ſorts of Veſſels, wherein the air and the blood are conveighed, the Lymphæducts that carry forth a water are joined. A power of theſe diſperſed through the Lungs, wait on the Arteries and Veins. All the branches tending from the ſurface of the Lung towards its original, unite into ſome greater trunks; which, being inſerted into the Wind-pipe, diſcharge thereinto the Lympha that is ſuperfluous from the blood and nervous humour. Indeed there is need of a great many of this ſort of Veſſels in the Lungs; becauſe, ſeeing the blood is hotteſt of all here, is haſtily circulated, and yet can exhale nothing to without by tranſpiration, the Veins can hardly receive all the whole maſs of blood from the Arteries; and the Glandules contain not long what is depoſited in them: therefore there as need of Lymphæducts as ſo many chanels, whereby the ſuperfluous humour might continually be ſent off. If theſe at any time happen to be obſtructed or broken, there often follows a Dropſie of the Lungs or Breaſt, and ſometimes Coughs and Phthiſicks. Theſe lymphatick Veſſels of the Lungs may very well be ſeen, if in diſſecting a live Dog you preſs the top of the Thoracick duct, that nothing may be poured into the ſubclavian Vein: for then the Lymphæducts of the Lungs, becauſe they cannot diſcharge themſelves into the common Receptacle now ſtopt and filled, ſwell much and are very apparent. If ſuch a ſtoppage be made for ſome time in a Dog that hath eat and drunk largely, a milky liquor will ſweat into the Lungs out of the Thoracick duct, the Valves being unlocked: yea and the ſame liquor will paſs through the Lymphæ-

ducts

ducts placed far beneath the Reins, and will render them ſtrutted with that humour, as if abounding with milk. The rough delineation of the Lymphæducts ſpreading themſelves in the ſuperficies of the lobe of a Lung, is repreſented in the firſt Table.

The nervous ſlips diſperſed throughout the Lungs.

5. The laſt kind of Veſſels belonging to the Lungs are the Nerves and their branches, whereof there are many (as we elſewhere intimated) diſperſed every where through the Lungs. Heretofore doubting about the office of theſe, we were induced to think the firſt force, or at leaſt inſtinct of breathing depended on theſe Nerves; becauſe otherwiſe we can hardly conceive, after what manner the motion of the Lungs in breathing, coughing, laughing, and other their actions ſhould be always ſo exactly proportioned according to the ſeveral exigences of Nature. For even as the blood doth more intenſly or remiſly heat and boil up within the *Præcordia*, and as certain contents of the *Trachea* provoke the nervous Fibres, we breathe either quicker or ſlower, and oft-times, though unwillingly, we cough. But beſides there doth occur another and more neceſſary uſe of theſe Nerves: for ſince it is manifeſt, that the Coats of thoſe Veins and of the *Trachea* are every where endued with muſcular or moving Fibres by which they are contracted, it is plain, that the Pneumonic Nerves do convey as well plenty of ſpirits, as inclinations of contraction to thoſe Fibres. And it is very probable from thoſe Nerves convulſively diſtempered, that the Palpitation of the Heart is often excited, as alſo the Aſthma and Chin-cough. We have ſome time ſince delivered the Anatomy or deſcription of the Pneumonic Nerves in our Treatiſe of Nerves, *viz. pag.* 311, ſo that there is here no need to repeat or inlarge. The fivefold Veſſels forementioned being mutual, and many ways accompanied in their diſtribution, as if divided into ſecret Groves with ſmall bladders as in Trenches every where interwoven, when they are complicated and variouſly woven together do conſtitute a fleſhy web, which is the very ſtructure of the Lungs: which moreover appears like a more ſolid *Parenchyma*, in as much the Arteries and Veins being filled with blood are ſtufft up, and the Veſſels of the *Trachea* and Lymphæducts being emptied of the air as well as water, do fall together and ſeem to cloſe. We ſhall the leſs admire the fleſhy fabrick of this Lung wove together out of meer Veſſels and little Bladders, if we conſider the frame of the ſeminal Teſticles to be nothing elſe than a heap compoſed of hollow filaments or ſpermatic Pipes woven together. The deſcription of the Nerves of the Lung, and what relates to the bundle of Fibres whereof it is compact, and to the ſpreading of its branches, are deſcribed in the fifth Table.

The Coats of the lungs, whereof one is ſmooth, and the other rough.

The web of the Lung, as above-ſaid, being weaved together of Veſſels and little Bladders, and divided according to their greater and leſſer branchings into lobes and little lobes, a Membrane wraps them about as a common covering. Of this there are two Coats, *viz.* one outer and fine, which appears like a certain ſubtle texture or weaving together of nervous filaments (as is apparent in moſt other Bowels;) the other more inward, which is both rough and ſomewhat thick, and conſiſting almoſt of meer ends of Veſſels and little Bladders: and by reaſon of the hollowneſſes every where cauſed from theſe, its inward ſuperficies reſembles a Hive of Bees; the forms of theſe are aptly enough deſcribed in the eighth Table. This Membrane of two Coats blown up hath very many and large Pores, inſomuch that if Quick-ſilver be poured into the Trachial branch of one of the leſſer lobes, almoſt filling within the whole Membrane, it will every where burſt out from the Pores. Both the arterial blood and the air beating in this Membrane as againſt a bank, are reflected; the former is brought back by the Veins into the left Venter of the Heart, a certain watry part being ſent away through the Lymphæducts. In the mean while the air is returned back by the ſame paſſages of the *Trachea* by which it flowed in. For continually freſh air ought to be ſuckt in, that it might ſupply nitrous Particles to the Blood; to make room for which the other old air being now weak and uſeleſs, muſt be firſt breathed out. Becauſe therefore both functions are to be performed within the ſame paſſages, it is to be done by alternate turns, firſt the one, then the other. While the air is drawn in, the Lungs are blown up, as if wind were forced into them; and whilſt the ſame is breathed out they fall down, and are narrowly ſqueezed together for the benefit of excluding it; and ſo after the manner of Bellows diſcharge conſtant changes of the Syſtole and Diaſtole. Yet by what impulſe and Organs it is accompliſhed, is worth our labour here to conſider.

The Syſtole and Diaſtole of a Lung.

Therefore upon the whole matter it is manifeſt by common obſervation, the Diaſtole of the Lungs perpetually ſucceeds the opening the Breaſt, and its Syſtole in like manner its contraction; ſo that we may conclude, when the cavity of the *Thorax* be-

ing dilated a greater ſpace is yielded to the expanſion of the lungs, the extern air of its own accord leaps into the *Trachea*, whether by reaſon of the Pulſe, or by its own Elaſtic force (for it is all one) and preſently enters into its Trunk, the *bronchia* and all the little bladders, and blows them up; namely for that end, that its nitrous particles may every where occur to the blood, waſhing all parts of the lungs: afterterwards when the breaſt receding from that dilatation, is ſtraitned as to its cavity, even the lung being compreſs'd, falls together by its Diaſtole, and excludes the air even now breath'd in. But truly, becauſe the air doth not of its own accord leap out with that plenty as it skipt in, neither the hollowneſs of the breaſt ſo ſtraitly contracted, that it ſhould mightily compreſs the lungs; therefore all the paſſages of the *Trachea* are endowed with muſcular fibres, which being contracted orderly while we breathe out, they may promote the expulſion of air. Wherefore, that the cauſe of breathing, and the manner of doing it may more plainly be made known, inquiſition ought to be made after what manner, and by what Organs, that interchangeable dilatation and contraction of the breaſt are performed.

Its motion mechanically unfolded.

We cannot enough admire, concerning theſe motions, the cunning artifice of the Divine Creator, evidently adapted unto Mathematical rules; for truly in no other matter doth He more plainly appear ὁ Θεὸς γεωμετρῶν. For when both the enlargeing and the ſtraitening of the breaſt ought to be performed by ſome muſcles (to whoſe function it only belongs to contract;) the matter is ſo ordain'd, that the ribs which ſhape out the ſides of the *Thorax* even as of oblong parallel lines bowed towards a Cylinder, are brought one while in a ſquare figure with right angles for the enlargement of the breaſt, and afterwards into the form of a Diamond-figure with ſides unequal, with acute angles for the contraction thereof. What follows from the ſcituation of parts ſo chang'd, that whenas the ſides depart fartheſt from one another, the ends are brought nearer, and ſo *è contra*; and for that cauſe the largeneſs of the ſpace is wont rather to be altered than either augmented or diminiſhed; leſt it may ſo happen about the cavity of the *Thorax*, it is ſo provided againſt by an admirable workmanſhip, that whileſt the ribs aſcend upward for enlarging the breaſt to a ſquare figure, leſt the ends ſhould be ſhortned inward, the *Diaphragma*, which cloſes the bottom, ſwells downward toward the Abdomen; ſo that the *Thorax* may be enlarged as well towards its length as to its depth: on the contrary, while the ribs beneath are brought to ſtraiten the breaſt towards the figure *Rhomboides*, leſt they ſhould depart farther than they ought, the Diaphragma aſcends upwards for that cauſe that the largeneſs of the *Thorax* may be ſtraitened, while we breathe out, according to both dimenſions.

The Muſcles ſerving reſpiration.

What belongs to the muſcles of the breaſt, ſerving as well to the enlargement for ſucking breath, as to the conſtriction for breathing out, the moſt wiſe Creator of Nature hath ordained more and ſundry inſtruments of either function; Therefore truly that the work of breathing being eſpecially neceſſary as to life might be performed inceſſantly and very ſtrongly, ſome of the former order of Muſcles, *viz.* thoſe by which the hollowneſs of the *Thorax* is opened, do raiſe the ribs and afterwards draw them back, even as they are bow'd and more enlarg'd; in which number there are three muſcles to the ſhoulder, one belonging to the loyns, and eleven intercoſtal outward; and another inward muſcle, *viz.* the Diaphragma, depreſſes the bottom of the breaſt, and enlarges its length and depth.

Their function as well in inſpiration;

The aforeſaid muſcles, *viz.* the ſcapular, lumbar, and intercoſtals being alſo appointed with the Diaphragma for the function of breathing, are accurately enough deſcrib'd by many Anatomiſts, but chiefly by *Fallopius*, that here ſeems little need to unweave this web; eſpecially becauſe a more full and permanent knowledge of theſe parts is not wont to be acquired unleſs by frequent diſſections and anatomical inſpection. The four former muſcles being of divers forms, conduce chiefly to ſtronger and violent inſpiration; but the exterior intercoſtals in regard of the ordinary actions of breathing employ their continual endeavours by turns during life, every one of theſe being uniform, with a fleſhy and more thick baſis, being rooted in the bottom of the upper rib are carried by oblique fibres, and broad towards the forepart unto the top of the rib that lyes under, and are implanted to it with a ſmall and tendonous end; whence it follows, thoſe fibres being ſwell'd, and ſhortened towards their root, do lead and draw back the nether rib towards the upper; and ſo while all theſe muſcles are contracted together, all the ribs are raiſed upwards, and altered from oblique angles into direct ones, they render the trunk of the *Thorax* more large, but ſome-

 thing

thing ſhorter; which defect that it may be helped, the Diaphragma (which being free before from the Syſtole, is hidden within the cavity of the breaſt) together with the ribs drawn upwards, is extended beneath; ſo that the breaſt, as it were a Drum braced, does become moſt capacious; and in the mean time the lungs, having a more ample ſpace yielded to them, are blown up by the air ruſhing in whereſoever there is paſſage, and fill the whole hollowneſs of the *Thorax* enlarged.

Thus far touching the muſcles ſerving to inſpiration, which ever and anon ceaſing from contraction, the ribs preſently fall down from a direct poſition into an oblique; and the Diaphragma alſo being freed from its extenſion, aſcends into the cavity of the breaſt, or is rather thruſt thither by the bowels of the Abdomen; and ſo by reaſon of the poſition of parts ſo changed, *viz.* the breaſt ſtraitened, and the lungs compreſſed, the act of exſpiration doth ſucceed. Some have determin'd this to be a meer intermiſſion of the other, and onely to proceed from the reſt, or ceaſing of the muſcular motion (by which breathing is performed.) But the declination of the ribs from right angles into oblique, and the aſcenſion of the Diaphragma, is related to be the natural poſition of theſe parts, becauſe they are found in ſuch a ſcituation in dead bodies. I think my aſſent not eaſily owing to this opinion, becauſe ſometimes the function of exſpiration is performed much ſtronger and more violently than that of inſpiration, as in coughing, ſinging, laughing, hollowing, and in other affects whoſe exerciſes are the more difficult labour and more earneſt endeavours of the breaſt. Wherefore there is no reaſon that we ſhould think that ſuch vigorous exerciſes of expiration, ſhould be excited by the meer reſt and ceaſing of the aforeſaid muſcles, but from the motion of others oppoſed to them. Moreover the Muſcles now cited and oppoſite, and ſtraitning the breaſt, ſeem to be required not only by reaſon of their violent exſpiration, but for their ordinary and conſtant ſervice, at leaſt for the poiſing the function of reſpiration: for otherwiſe thoſe other whoſe office it is to enlarge the cavity of the *Thorax*, being ſometimes unmindfull of their task, do it either ſtronger or longer than is convenient; wherefore it is neceſſary they be forthwith admoniſhed by others, *viz.* their Antagoniſts ſubſervient to Expiration, and to be reſtrained in their duty. But the muſcles appointed for the ſtraitning the breaſt, are the *Sacrolumbus*, the Triangular, and inward Intercoſtals, and ſome muſcles of the Abdomen; the uſe and deſcriptions of all which are delivered by many Anatomiſts, and moſt accurately by *Fallopius*. The inner intercoſtal muſcles as they obtain a contrary ſcituation, ſo a contrary function to the outer intercoſtals, which namely is to depreſs the ribs, and to ſtraiten the cavity of the breaſt, by forcing it into the *Rhomboidal* Figure. For we are to obſerve, that the carneous and thicker baſis of each of theſe is implanted in the loweſt part of the nether ribs, and the moving fibres, aſcending from thence obliquely and forward, and dividing croſs-wiſe the reſt of the outward intercoſtals, with their ſmaller and Tendony end are engrafted in the bottom of the upper-rib; hence none need doubt, but that theſe inner muſcles do depreſs all the ribs, or bring them downward: but whilſt theſe ribs are ſo depreſs'd, that the trunk of the breaſt is rendred more ſtrait, theſe inward muſcles (otherwiſe than the outer) do not only incline the ribs downward, but alſo their griſtly or cartilaginous proceſſes. For *Fallopius* hath acutely deſcribed this: *That the outward intercoſtal muſcles do onely fill up the inter-ſpaces of the ribs and not of the griſtles, but the inward fill up both ſpaces.* The reaſon whereof ſeems to be after this manner, affording a moſt delightfull ſpeculation of the *Divine Architect*, viz. while the ribs are brought upwards to the exerciſe of fetching in breath, and are withall drawn back towards the Spine, that motion commencing backward, is performed by the ribs themſelves; which being firſt moved together, the cartilages eaſily diſcharge their function as cords fitted to that purpoſe: wherefore there ſeems little need of the muſcular aid to place theſe in their order; but to put the ribs in action, not onely the intercoſtal muſcles afore mentioned, but the four other greater ones do continually endeavour it; but on the contrary, that the ribs may be depreſs'd and brought forwards together, the force taking its riſe before, is performed by the cartilages as ſo many leading cords, moſt eaſily bending the ribs downwards as far as need requires.

As in expiration.

Moreover to this end, that the cartilaginous appendices of the ribs may be drawn down and nearer one the other for the exerciſe of expiration, not onely the inward intercoſtal muſcles fill as well the intervals of the cartilages as of the ribs, but moreover an entire triangular muſcle is allotted for this function; for this ſpringing beneath from the bone of the Sternon, and aſcending upwards obliquely, is inſerted in-

to the lower Cartilages, which it conſtrains towards its head, and bends the *Thorax* nearer on the other ſide. That is worthy of conſideration, which *Fallopius* hath remarked touching this muſcle, *viz.* whereas it is ſo little and minute in a man, that it may hardly be allowed for a Muſcle, it is ſtretched out in a Dog along the whole bone of the Breaſt, and reaches to all the Cartilages, even thoſe inoſculated into the Sternon of the true Ribs. The reaſon of which difference clearly points at the Divine Providence touching the Fabrick of Animals. For whereas this Animal is born to moſt ſwift and long running, that the blood, while it is more vehemently agitated, may duly be kindled and fan'd, as it ought ſwiftly and ſtrongly to draw in the air, even ſo to expire it; (for that freſh air may be more freely ſuckt in, it behoves that all the old be ſtrongly caſt out and exploded) therefore for the ſtronger diſcharge of this exerciſe (of the which little uſe in a man) this Muſcle of a Dog is allotted a great bulk, proportionable to ſuch a work.

Wherefore the triangular Muſcle being ſmall in a man, is ſtretched out through the whole bone of the breaſt in a Dog.

Hitherto of the Muſcles that ſtraiten the Trunk of the Breaſt: by whoſe proviſion it is manifeſt enough, that the relaxation of the oppoſite muſcles are not ſufficient to this function. But that while the breaſt is conſtrained, the Diaphragma aſcending upwards may ſhorten its hollowneſs, it is not enough that it is releaſed from its contraction, but it is alſo neceſſary, that as ſoon as this ceaſes, the muſcles of the Abdomen being contracted ſqueez together the Bowels, and preſs them upwards, by which the Diaphragma being relaxed, is lifted up and driven higher into the Trunk of the *Thorax*.

The Diaphragma follows the motion of the Abdomen.

From the ſuppoſed reaſons of theſe things we may infer, no leſs endeavours of the muſcles are imployed in the exerciſe of expiration, than in inſpiration: nay rather we may affirm them greater, after this is added, that the Pipes of the *Trachea* and *Bronchii* are endowed with muſcular Fibres (as we have ſhewed) which being only contracted while we expire, do cauſe the air contained within to be caſt out with the greater force. And truly ſo it ought to come to paſs, becauſe the air prevailing with an elaſtic force, doth of its own accord readily enter the pulmonary paſſages, as often as they are ſuffered to be open; but from thence that again it may preſently and thorowly be excluded, there needs a certain force and compreſſion of the parts to thruſt out. For although the inſpiration precede in courſe, yet it is neceſſary that expiration follow immediately after, and be proportioned according to the faſhion thereof; for that it may be great, the turns or changes of this being greater are requiſite. Wherefore in vehement exerciſe of the whole body or of the Lungs alone, that the freſh air may more plentifully be drawn in, all the old air muſt be moved, not only out of the *Trachea* and *Bronchii*, but alſo out of the fartheſt little Bladders every turn or change of breathing out, and expulſed moſt of it: whereas while we draw in the breath only the muſcles of the Breaſt are imployed, the Lungs having reſpite, in ſtrong breathing out both the oppoſite Muſcles and the Lungs themſelves labour.

The labour of Muſcles the ſame in exſpiration as in inſpiration.

Having thus explained the Organs of Breathing, it remains yet to be inquired into, by what inſtinct, being ſtirred up to motion, they ſo repeat perpetual changes of Syſtole and Diaſtole, that one while theſe muſcles are contracted for inſpiration, and another while for expiration, in the mean while the oppoſite muſcles have a pauſe, and are moved by turns, that they mutually give place to themſelves ſucceſſively. From all this in the firſt place it is clear (which likewiſe in another place we have abundantly declared) that the animal Spirits, for the exerciſing the contractive motion of the muſcles, leap from the Tendons into the fleſhy Fibres, and afterwards for their relaxation they recede out of theſe into thoſe. Moreover, whereas the mutual function is twofold, *viz.* ſpontaneous and meerly natural, we have before ſhewed in the former, that the Spirits are brought from the Tendons into the fleſhy Fibres by approaches according to the command of appetite, and to remain within during the action, till they are diſmiſſed by its will; and afterwards return into the Tendons, till they are again commanded forth; inſomuch that the times of their motion and reſt are unequal and uncertain, and variouſly determined at our pleaſure.

The cauſes of the above-mentioned motions.

In the animal function.

But it is far otherwiſe in the natural function: becauſe the animal Spirits are carried out from the Tendons into the fleſh by perpetual turns, or conſtant reciprocation, and a ſhort contraction being made, preſently leap back from the fleſh into the Tendons, and ſo alternately: after which manner the Heart it ſelf, the Organs of the *Trachea* and breathing, alſo the fleſhy Fibres of the Stomach and Guts, unleſs they are otherwiſe limited by reaſon of their objects, are drove on by their conſtant Syſtole and Diaſtole.

And natural.

It

It will be needleſs to repeat here what we have already obſerved in another place touching theſe two kinds of motions, *viz.* that the animal ſpirits of the ſpontaneous moving function are altogether or chiefly diſpenſed from the brain, and the others cauſers of the meerly natural function are diſpenſed from the *Cerebellum*; moreover alſo as the plenty of both ſorts of ſpirits, ſo the very inſtincts of beginning thoſe actions have their conveyance through the Nerves.

The motion of the former ſort ariſeth from the brain, the other from the Cerebellum.

Notwithſtanding here ariſeth a doubt, to what kind of moving function, *viz.* whether ſpontaneous, or meerly natural, the actions of breathing ought to be referred; alſo of what original, *viz.* whether of the Brain or *Cerebellum*, the animal ſpirits appointed to that employment, are. It is manifeſt enough that this function is in a ſort partaker of a ſpontaneous motion, becauſe it is in our power one while to ſhorten its exerciſes, at other times to prolong, and otherwiſe diverſly to alter them, yea ſometimes a little to reſtrain them. Moreover the nerves belonging to its chief moving Organs, *viz.* the Diaphragma and Muſcles of the breaſt, ſpringing from the nerves of the Arms and Loyns, do owe their deſcent to the Brain, and do plainly acknowledge the ſpirits they contain are chiefly ordained for voluntary motions: but moreover on the contrary, this function is ſo far natural, that its organs do reciprocate the conſtant changes of Syſtole and Diaſtole in ſleep, without our notice, and while we wake, we not perceiving it: Moreover although we can for ſome little time ſtop its exerciſe, or at our pleaſure vary it, yet we deny it to be altogether or long ſuſpended: beſides, although the nerves appointed to the muſcles of the breaſt and Diaphragma proceed from the ſpinal nerves, yet theſe latter coming from the branches belonging to the arm communicate in their progreſs with the ſlips of the intercoſtal nerves; moreover, all the other nerves (which belong to the *Cerebellum*) ariſe from theſe, which are ſpread about through the *Trachea* and Lungs.

It is a quære of what kind the actions of breathing are.

From theſe it plainly follows, that the power of breathing is as it were a mixt action, and doth participate of either moving function, *viz.* as well of the ſpontaneous as natural; and that the ſpirits and nerves of either Province are imployed in this duty, which proceed as well from the brain as from the *Cerebellum*; and truely ſo it ought to come to paſs according to the animal government: for although ſome actions of breathing neceſſary for the preſerving life, ought to be conſtant and perpetual, there are yet many other motions of the breaſt and lungs onely occaſional, and to be perform'd at our pleaſure, as may be diſcerned in laughing, crying, ſinging, hollowing, whiſtling, and other ſingular offices of the lungs and wind-pipe; in which works that they may be done ſtrongly, the muſcles conſpire together, and endeavour joyntly. As in violent labours and exerciſes of the whole body, by which the blood being ſtirred up doth want the greater ventilation, the arms being vehemently moved alſo do force the muſcles of the breaſt, and other pneumonic organs, into more ſpeedy motions for a more frequent breathing. And truly for joint labour of this ſort of the Arms and Diaphragma, the nerves ſerving this motion proceed from the nervous branches of them. Moreover, it is provided for this purpoſe, leſt the exerciſes of the body might enfeeble at any time the ſtrength of the lungs, or exceed the order of breathing; for when its organs labour more difficultly, or begin to be weary, the nerves of the Diaphragma do warn the other nerves of the arms, plucking them and as it were admoniſhing of their duty to deſiſt from an over intenſe motion.

It is concluded to be a mixt act.

For whereas the function of breathing is ordained for many uſes, whereof ſome are merely natural, and others ſpontaneous or violent; therefore the ſpirits and the nerves which proceed and have their government as well from the brain as from the *Cerebellum*, ought to be joyned together, and to afford their ſocial endeavours; yet on that condition, and as it were by mutual agreement, that one give place to the other by turns for the diſcharging all works chiefly neceſſary, or convenient, and do mutually obey. From the pneumonic nerves, the inſtinct of ordinary breathing or meerly vital beginneth, and is preſently communicated to the nerves of the Diaphragma, and from thence to all of the *Thorax*; ſo that preſently all the moving parts agree together in the action, and cauſe the Syſtole and Diaſtole of the breaſt in ſuch ſort as are required to the preſent ſtate of the blood; notwithſtanding on the contrary, as to other actions of breathing, whether ſpontaneous or violent, it ſeems to have them alſo, *viz.* the inſtinct or firſt force of theſe, beginning one while from theſe muſcles, another while from them is preſently communicated to all the other Organs; ſo that it is called upon by a working conſort of all together ſooner than the twinkling of the eye, for the performing the deſigned acts of breathing.

The nerves of the lungs ſome rulers of the natural motion, and others of the voluntary.

Both do alternately obey one the other, and agree in their office.

Wh.

What we have hitherto declared about the Organs of Breathing and their functions and uſes, that they may more clearly be manifeſt, it ſeems to be material to expoſe to your view the forms of ſome of their chiefeſt parts deſcribed to the life, together with the explication of their Figures: yet it ſeems proper firſt to inſert a few things concerning the Lymphæducts and interſpaces of the Lobes omitted in the former Diſcourſe.

The interſpaces of the little Lobes have paſſage one into the other, and from thence into the Lymphæducts.

The moſt renowned *Malpighius* firſt diſcovered theſe little Lobes of the Lungs and their interſpaces; but to what uſes they ſerve he hath not clearly enough ſhewed. Haply it may ſeem that theſe little places and empty ſpaces within the Lungs, are certain receptacles of the air (that there may be a larger ſtore of it.) Notwithſtanding it is evidently manifeſt upon experiment frequently made, that the air pufft into the Pipe of the *Trachea* (which is the only entrance into the Lung) doth not enter or blow up theſe interſpaces of the little Lobes: notwithſtanding if you blow into the hole of any of theſe interſpaces, immediately all theſe ſpaces pufft up do ſwell in the whole lobe of the Lungs, ſo that all the little lobes diſtinct by great interſpaces, will appear with a pleaſant proſpect; as is expreſſed in the ſecond Figure of the third Table. Moreover the Lymphæducts creeping through the ſuperficies of the Lungs, ſeem to be every where included in little Membranes covering thoſe interſpaces, and to end in them. But as the lymphatic Veſſels are all furniſhed with little valves, ſo thoſe which appertain to the Lungs are furniſhed with almoſt infinite; as is to be ſeen in the warm large lobe of an Ox, and expreſſed to the life in Tab. 1. d, d, d, d.

Which therefore is done, that the vaporous ſteaming of the blood being received by the interſpaces, and condenſed into water in the Lymphæducts, may be conveyed out.

That I may dare to conjecture concerning the uſe of theſe things, it is probable, that thoſe cavities intercepting each little lobe, do receive the vapors flowing copiouſly every where from the blood being kindled, (when they cannot any where elſe be better thruſt down or ſeparated) which ſweat through their ſlender Coats into theſe cavities out of the ends of thoſe Veſſels, and thence being forced further, they are condenſed into water to be carried out of the Lungs through thoſe appropriate Veſſels: moreover leſt the Lympha's cauſed from vapors within thoſe paſſages, and ſo being made thick, ſhould whirle again back into the Lungs (which would bring great prejudice to them) the thickeſt obſtacles of the valves do hinder. For I have frequently admired what becomes of the vaporous ſteams which inceſſantly flow in great plenty, and ſometimes moſt impetuouſly out of the blood burning ardently in the *Præcordia*. For although very many of them flye away through the paſſages of the *Trachea* together with the air while we breathe, notwithſtanding one only way of paſſage or particular ſluice doth not ſuffice to them, from every place breaking forth: wherefore theſe little places or empty ſpaces are every where placed, that they may receive thoſe vapors ſhut up in the Lungs, and may drop out the ſame immediately condenſed through the Lymphæducts, as if through ſo many noſes of an Alembick.

The progreſs and diſtribution of the pulmonary Lymphæducts.

The lymphic Veſſels having their paſſage out of the Lungs incline towards the paſſages of the *Thorax* with their numerous branches, and are for the moſt part mingled with them; but they climb upon the *Oeſophagus* in their way, as alſo the trunks of the *Trachea* and the *Aorta*, and do loſe many ſlips in them by a various inſertion; likely for this cauſe, that ſome of the lymphatic humor may be beſtowed for making ſlippery the ſides of thoſe Veſſels.

The Explication of the Figures.

THE firſt Table ſhews one entire lobe of the Lungs, upon whoſe ſuperficies the Lymphæducts are ſeen ſpread through every where.

A. *The Orifice of the* Trachea *being cut lying in the midſt of the Veſſels.*
B. *The Orifice of the Pneumonic Artery lying under.*
C. *The Orifice of the Pneumonic Vein placed above it.*
d, d, d, d. *The outer Lymphæducts ſpread abroad through the ſuperficies of the Lobe.*
e, e, e, e. *More Lymphæducts meeting on the back of this Lobe, from whence they paſs into the Thoracick ducts.*

The ſecond Table ſhews one lobe of a Sheeps Lung cut in the midſt, that the upper part (wherein is the trunk of the Vein) being removed, and the trunk of the *Aſpera Arteria*


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C
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B
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e

Tab: II. *part. 2.ist*

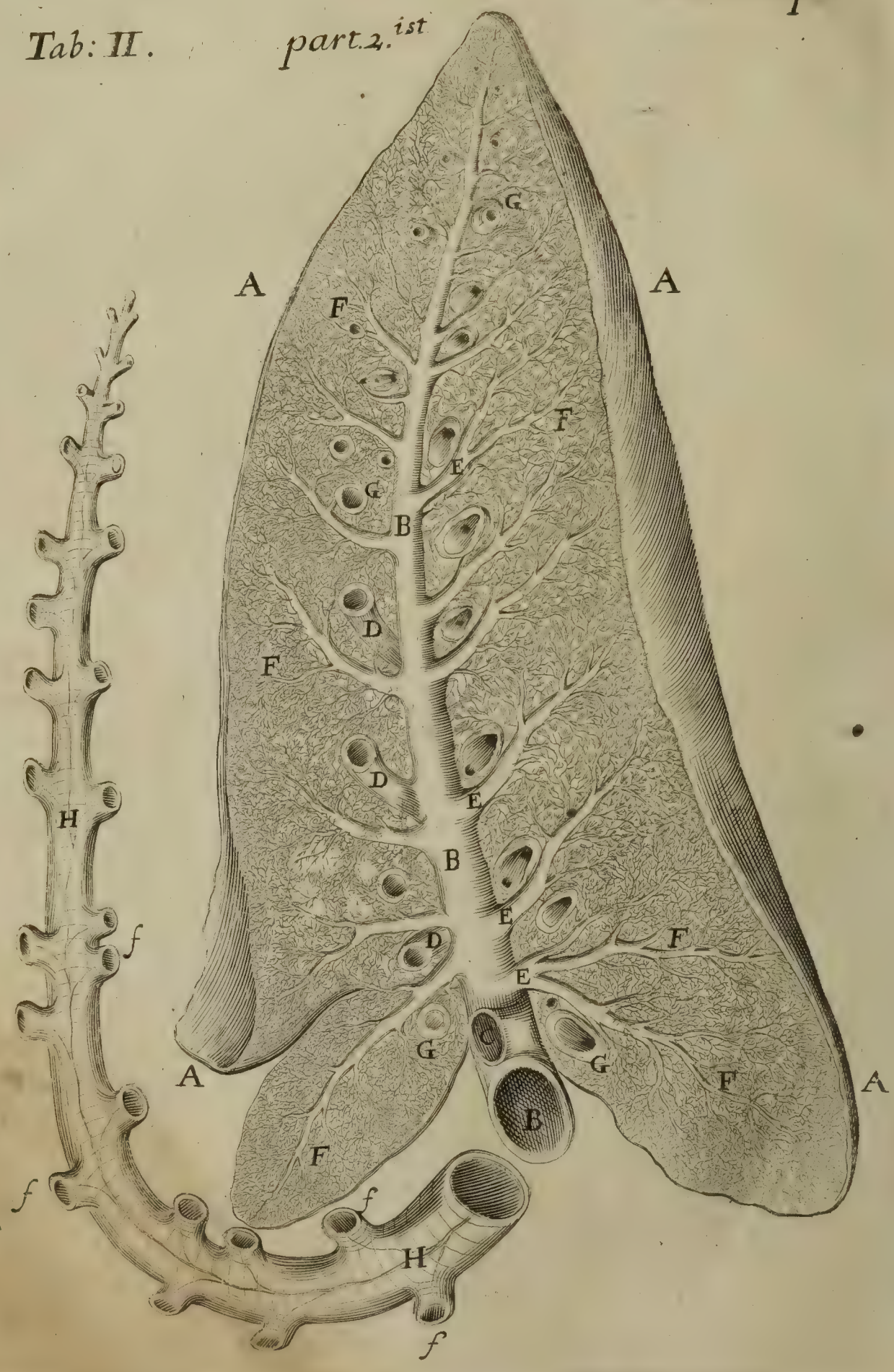


Fig: 1.



Fig: 2.

Arteria laid by it ſelf, the branching of the Pneumonic Artery is ſhewn throughout its whole frame, *viz.* through the ſmall and leaſt little Lobes. All the paſſages of this, *viz.* the ſlips and twigs how ſmall ſoever, being filled and coloured by any liquid thing caſt into them, are drawn to the life.

A, A, A, A. *The nether half of the Lobe divided, containing the branching of the Pneumonic Artery.*
B, B, B. *The Trunk of the Pneumonic Artery belonging to this Lobe.*
C. *A hole from whence its other branch was cut off and removed.*
D, D, D, D. *The Trunks from which its other branches (becauſe they could not be expreſſed in this Table) were cut off.*
E, E, E, E. *The arterious ſtems thereof ſtretcht forward into length, the ſide-branches on both parts ſtretcht out into the right and left ſide.*
F, F, F, F. *The twigs and leſſer ſlips, which are every where intermingled with the like from the Veins and Bronchials; and at laſt woven together with the Veins every where encompaſs the orbicular little Bladders, and bind them as it were in cluſters.*
G, G, G, G. *The Bronchial branches, which being cut from the ſtem of the* Trachea *laid aſide, and entring ſecretly into this lobe of the Lungs, are accompanied with branches that bear blood.*
H, H. *The ſtem of the* Trachea *appertaining to this Lobe, which lay upon the Pneumonic Artery, cut and laid aſide.*
f, f, f, f. *The ſtems of the Bronchial branches, which are immerſed partly in this portion of Lobe deſcribed* G, G, G, G, *and are partly diſtributed in the other half cut off.*

The firſt Figure of the third Table expreſſes one lobe of the Lungs, according to the branchings of the *Aſpera Arteria* divided into leſſer and leſs lobes, the twigs and ſlips of which Veſſel being filled by a liquid firſt injected, and afterwards ſeparated from among themſelves towards the little lobes, are alſo drawn to the life.

A. *The Trunk of the* Aſpera Arteria *being cut from the reſt of his body.*
B, B, B. *The inner part being cut open, that as well the holes leading into all its branches, as its ſtraight muſcular Fibres, are viewed together.*
a, a, a. *The abve-mentioned holes leading into the every where ſtretched out branches.*
b, b, b. *The ſtraight muſcular Fibres, upon which the other circular do lye.*
C, C. *The upper part of this Tracheal ſtem being whole or ſhut, that the Ring-like Griſles might appear.*
D, D, D, D. *The branches of the* Trachea *conſtituting the leſſer lobes are whole and ſhut, that the Ring-like Griſle may alſo appear in them.*
E, E, E, E. *The like branches being cut open, that the holes and ſtraight muſcular Fibres may be ſeen together.*
F, F, F, F. *The trunks from which the Tracheal branches being cut off are removed, that there may be ſpace afforded to the reſt, when cut open.*
G, G, G, G. *The ſecondary little lobes hung upon the trunks of the* Bronchii *as grapes; which alſo may be divided into leſſer lobes, the more inward paſſages of all which paſs out of the* Bronchii *into the little bladdery Cells.*
h, h, h, h. *The Veſſels bringing blood crawling over the ſuperficies of thoſe little lobes.*

The ſecond Figure of the third Table expreſſes a part of the pulmonary lobe, wherein the membranous interſpaces being blown up, all the little lobes appear in their proper figure, and do ſomewhat repreſent the leaf of Polypody.

A, A. *A part of the* Aſpera Arteria *complicated with the other Veſſels, to which trunk made up of all thoſe, the little lobes grow like leaves of a tree.*
b, b, b, b. *The little Lobes themſelves.*
c, c, c, c. *The Veſſels bringing blood creeping through them.*
d, d, d, d. *The membranous interſpaces of the little lobes, which alſo are covered with* e, e, e, e, *the Veſſels bringing blood.*

The fourth Table expreſſes as well the Veſſels belonging to the *Trachea* as thoſe bringing blood, ſeparate and diſtinct one from another, conſtituting one little Lobe, as alſo the peculiar framing of every one of them.

The

The firſt Figure repreſents the ſeparating into divers parts the Tracheal branch diſtributed into one little lobe, and the branching into Pipes and orbicular little bladders.

A, A, *The trunk of the* Aſpera arteria, *in the ſuperficies whereof the ring-like griſtles do appear.*
b, b, b, b, *The leſſer branches going from that trunk, wherein alſo little Rings appear.*
c, c, c, c, *The paſſages of thoſe branches into orbicular little bladders, which ſeem like the cluſters of Grapes.*
d, d, *The Veſſels bringing blood, diſtinct from the Pneumonic which cover the Trachea, and ſerve to nouriſh it.*

The ſecond and third Figure ſhews diſtinctly the equal branchings of the Artery and Pneumonic Veins within the ſame little Lobe; both which being complicated with Tracheal Veſſels, do for the moſt part make up the texture of the pulmonary frame.

The fifth Table ſets forth the pulmonary Nerve more accurately deſcribed by the aid of a Microſcope: ſo that it plainly appears that the Trunk is as it were a bundle of innumerable little Fibres bound together; moreover its Trunk, while it creeps into the lungs in the likeneſs of Mother of Time, doth ſpread the various little ſprigs every way.

Fig. 1. reſembles a part of the nervous trunk cut away, one end whereof being opened and lookt on by a Microſcope, ſeems to unfold it ſelf almoſt into innumerable little fibres.

A, *The trunk of the Nerve.*
a, a, a, a, *The little Fibres divided from one the other about the end cut off, and ſpread abroad.*

The ſecond and third figure do ſhew ſome fibres as well of the trunk as of every branch, and moreover the ſlips of the little twigs from divers ſtemmes often repeated.

B. *The chief trunk.*
b. b. b. b. *The little fibres about the extremity cut off explicated.*
c. c. c. c. *The little twigs ſpringing from the bundles of the little fibres.*

The ſixth Table firſt ſets forth the anatomy of the Artery bringing blood drawn in apt figures, which we have deſcribed in a late treatiſe.

The firſt and upper figures hereof, repreſent the four diſtinct Coats of that Veſſel, *viz.* the nervous, muſcular, glandulous, and the vaſculous.

1. *The firſt inward nervous coat*, which perhaps is ſomewhat muſculous, conſiſting of ſtreight or long fibres, which being contracted ſhorten the Pipe of the Artery.

2. *The coat properly muſcular*, conſiſting of a heap of ſmall circular fibres, which when they are contracted ſucceſſively under the ſtream of blood, do make its circuit to be ſhortened. It is from the motion of theſe that the arteries beat.

3. *The glandulous coat*, which (like that in the guts) being placed over the muſculous coat, is weaved together of very ſmall and moſt numerous glandules.

4. *The outward vaſculous coat*, which variouſly folded together and wreathed, of Veſſels bringing blood, and with ſlips and nervous fibres, ſeems like a certain little net.

The *ſecond and lower figures* of the ſixth Table, do ſhew the anatomy of the Vein, or its four coats expreſſed in fit places; which Coats do appear entire as ſucceſſively taken one part from the other (beginning outmoſt.)

I. *The outward coat* conſiſting of nervous fibres (which perhaps are ſomewhat muſcular) and as it were ſtreight or ſtretch'd out in length, although not orderly.

II. & III. *The vaſculous and glandulous coat*, which are the ſame as in an artery.

IV. *The moſt inward muſcular coat*, conſiſting alſo of circular fibres, as in an artery, which being contracted behind the ſtream of blood, haſtens its returning courſe.

The ſeventh Table expreſſes the diſtinct Coats of the *aſpera arteria*, and ſeparated one from the other.

The firſt figure ſhews the moſt inward Coat, endowed with ſtreight or long muſcular fibres.

The ſecond figure deſcribes the glandulous coat, and the third figure the vaſculous coat (whhic

part 2.ist



Fig: 1.

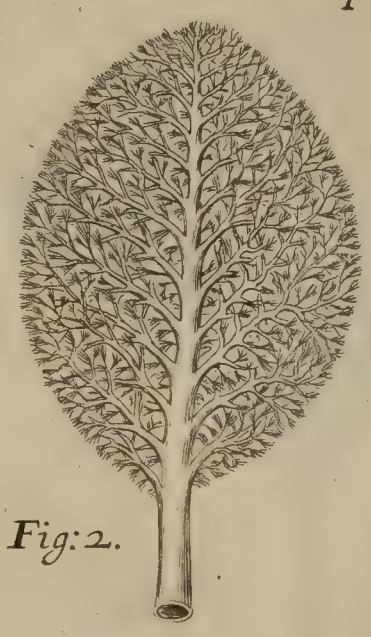


Fig: 2.



Fig: 3.

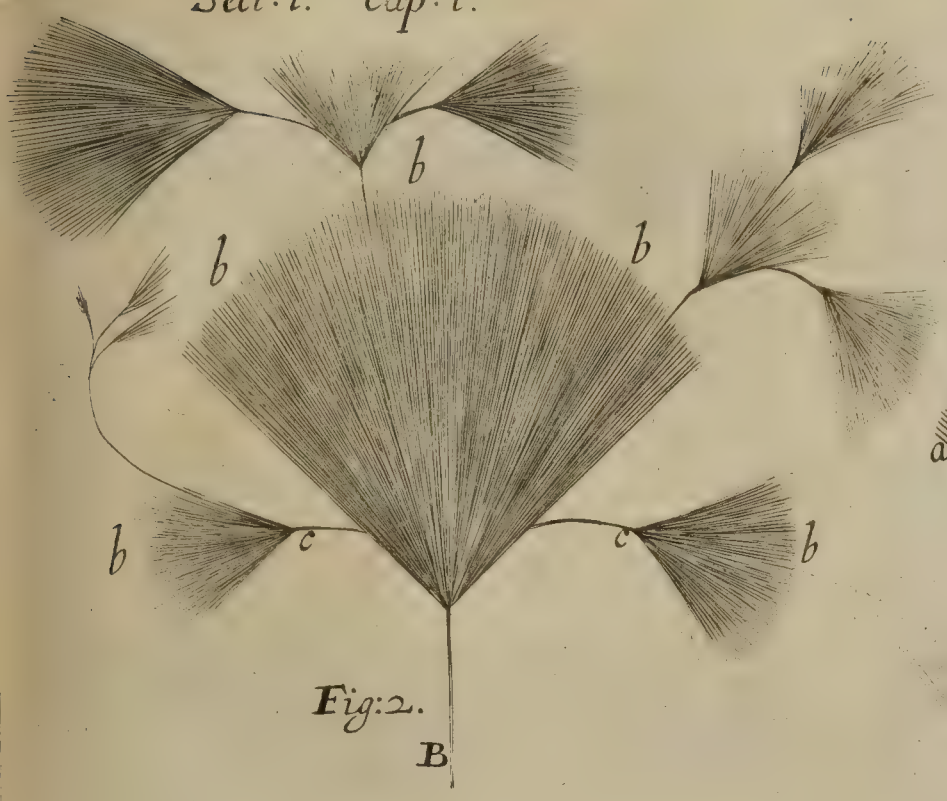


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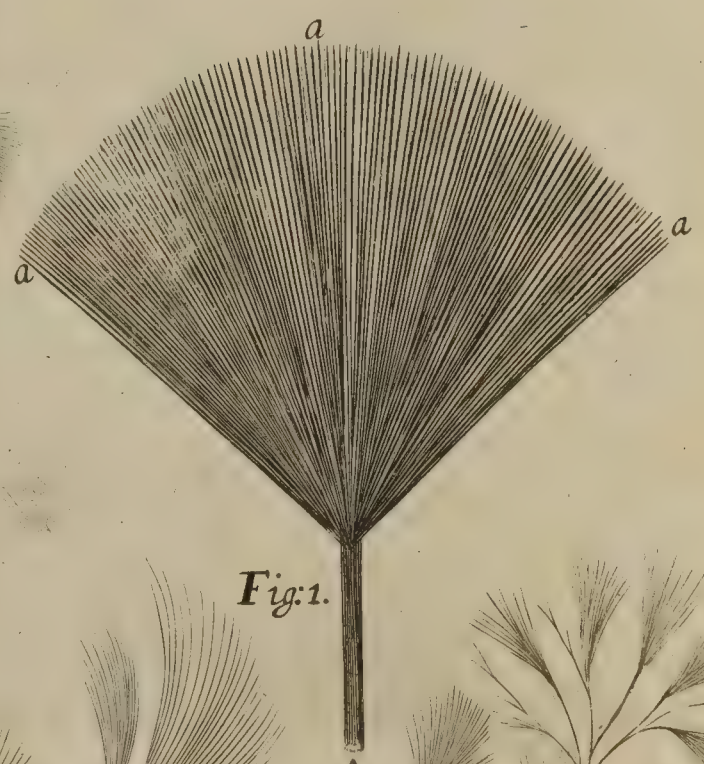


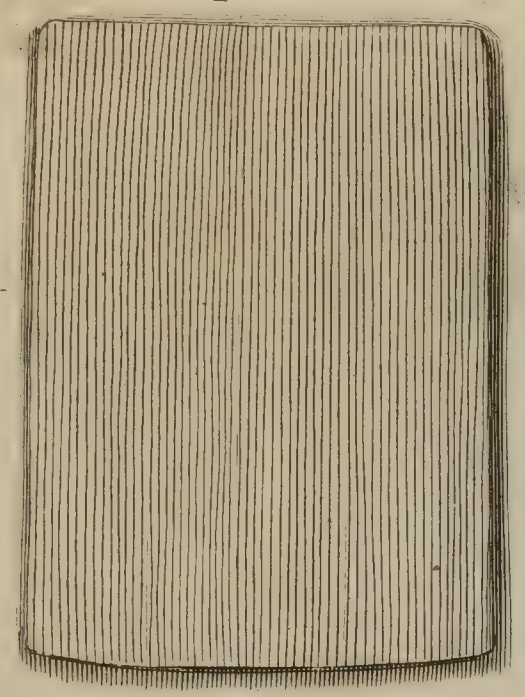
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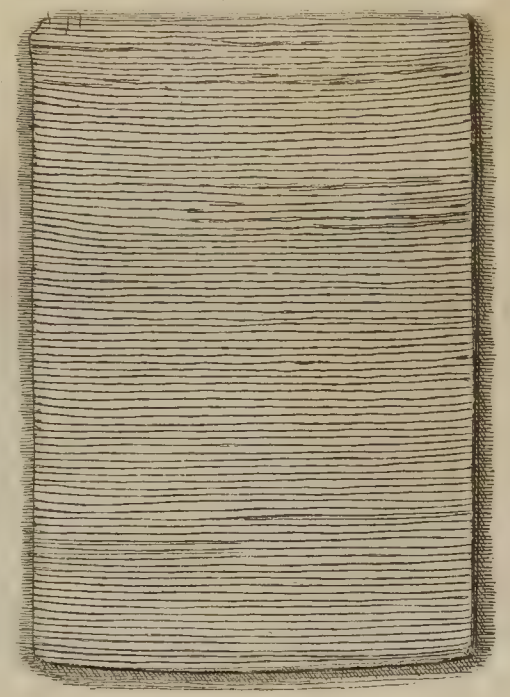
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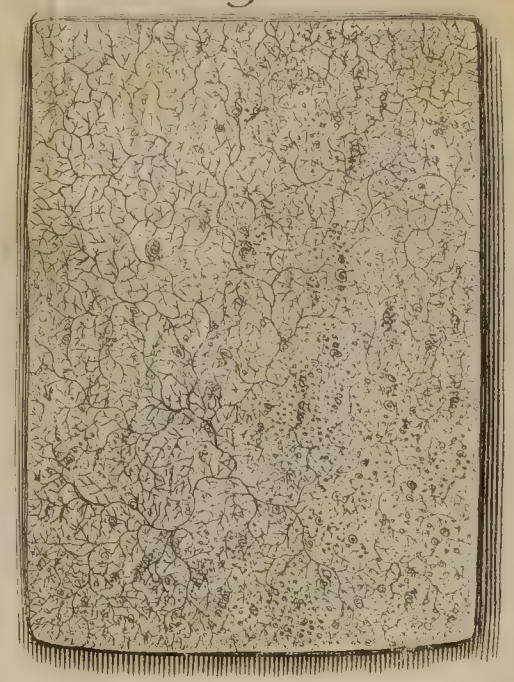
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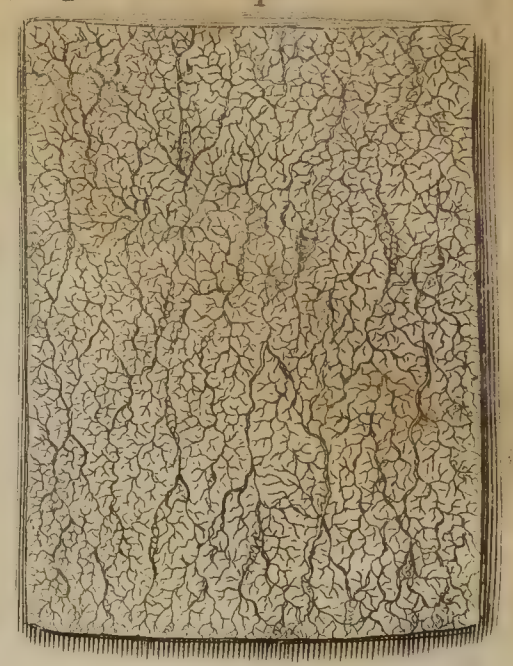


Fig: 2.

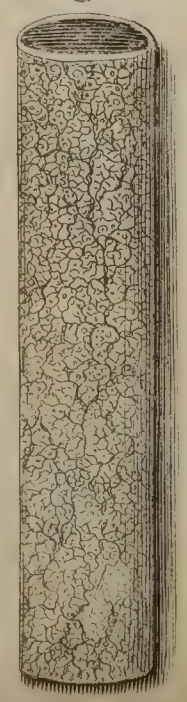
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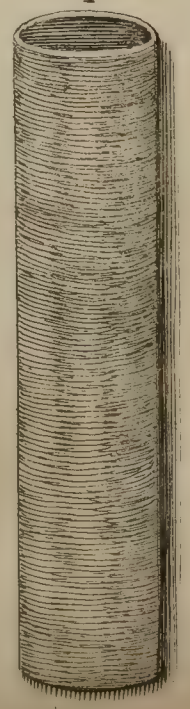


Fig 1



Fig: 3.



Fig: 4.

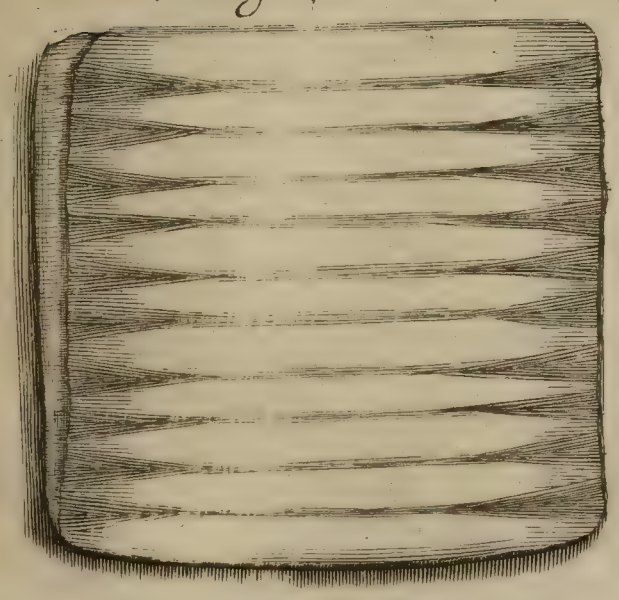


Fig: 2.



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Fig: 1.



Fig: 2.

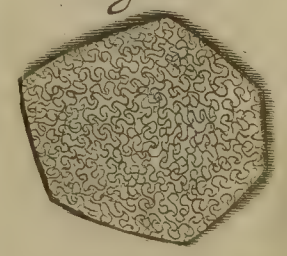


Fig: 3.



(which are almoſt the ſame as in the veſſels bringing blood, and alſo in the Guts.)

4. *The fourth figure expreſſes the outward coat* (which is partly cartilaginous, and partly muſcular.) The tranſverſe or annular fibres hereof do fill up and weave together the interſpaces of the Cartilages.

The eighth Table ſhews a part of the outmoſt pulmonary Coat covering over its whole frame, moſt finely and curiouſly deſcribed by the help of a Microſcope.

The firſt Figure ſhews a portion of the above-mentioned coat, which partly by reaſon of the extremities of Veſſels of every ſort ending in it, ſeems pricked full of holes as it were, and partly from the complications of the veſſels bringing blood, which like the twining ſprigs of Vines gird about the orbicular bladders, is diſtinguiſhed into many irregular *Area*'s.

The ſecond Figure repreſents a part of the outermoſt membrane ſeparated from the cluſters of veſſels pull'd off, and without any *Areæ*, onely markt with little holes as it were with ſmall pricks.

The third Figure expreſſes one ſingular *area* of the Coat above mentioned, augmented in largeneſs by the help of a Microſcope.

SECT. I. CHAP. II.

Of the ſundry kinds of Breathing hurt, and their cauſes, with the accounts of their Symptoms.

HItherto we have ſtrictly viewed the Lungs, and the parts any way ſerving their motions, and conſequently the vital function; which being many and different, and the proviſion of the Organs as many very accommodate to breathing; ſo the ſame are many wayes in hazard to be perverted or vitiated, upon ſundry occaſions. Truly a Watch framed with the greateſt artifice with a Spring, with wheels plain and toothed, with chain and ballance, is not more prone or eaſie to be obnoxious to depravation than this Pneumonic machine of the breaſt, through which by ſucking in air we preſerve the vital flame of the blood with its motion and heat. For whereas the veſſels of the lungs belong to the function of breathing, *viz.* the *Trachea*, with the *Bronchii* and little bladders; alſo the heart with arteries and veins, beſides which there are nerves with fibres as well muſculous as nervous, Lympheducts and Glandules; alſo the contents of theſe Veſſels, *viz.* Air, the old and freſh blood, with its *Serum*, the Lympha, and the animal Spirits; any fault happening in any of theſe doth oftentimes diſcompoſe the whole Pneumonic function. Nor leſs alſo the moving Organs of the breaſt, *viz.* the muſcles with the Diaphragma, and the nerves appointed to their uſe. And likewiſe ſometimes the animal ſpirits before they enter into thoſe nerves, being ill diſpoſed, often cauſe great diſorders in breathing.

The organs of breathing being hurt, the breathing is hurt alſo.

When the chief function and uſes of the Lungs have been to convey the blood and air through the whole frames of the parts and their inmoſt receſſes, and every their ſmalleſt paſſages, and every where to mingle them; namely for that purpoſe, that the venal blood returning from its circuit, and diluted with freſh juice, and thereby crude and as it were half extinct, may as well be more perfectly mix'd and wrought together, as more effectually kindled afreſh in all its parts by the nitrous air; from hence the chief faults about this buſineſs or function of the Lungs do moſt of all conſiſt in theſe two things. Firſt, that the blood hath not due paſſage through the *Sinus* of the heart, and the pneumonic veſſels: And ſecondly, becauſe the Air is not drawn in and breathed out in a due manner into the *Trachea* and its paſſages. There are two parts of either of theſe: For firſt as to the paſſage of the blood, ſometimes the fault is caus'd within the right *Sinus* of the heart, or the pneumonic Arteries; and alſo ſometimes cauſed within the pulmonary veins, or the left Ventricle of the heart: Secondly, as to the Air, the failure is chiefly in inſpiring and exſpiring; although each function offends ſometimes equally. There are divers accidents of each, and many cauſes and ways of its being done, whereof we will here briefly touch upon the chief.

The uſes and ends of breathing which uſe to be hurt.

The defects and failings of the Lung in its office.

Firſt in reſpect of the blood.

Therefore firſt, when the blood doth not duly paſs through the right Ventricle of the Heart and the Pneumonic Arteries, either it happens by its own fault, or by the fault of thoſe paſſages, and ſometimes by the fault of further paſſages. For ſometimes the ſtream of blood ſtops in the nether region of the *Præcordia*, by reaſon of obſtruction in the other; moreover, ſometimes the defect or fault of the air breathed in ſtops the free paſſage of the blood.

The opinion of the famous Sylvius *concerning the blood fermenting in the Lungs.*

What relates to that fault of the blood, when it paſſes not quick enough through the right *Sinus* of the Heart and Pneumonic Arteries, the opinion of the Renowned *Sylvius* ſhould here be diſcourſed, but that it would be too tedious, and from our purpoſe. For he ſuppoſes, *The deſcending branch of the venal blood, moiſtned with chyme together with the lymphatic humour returning from the whole body, hath the nature of an acid-ſweet ſpirit; and in the mean time its branch aſcending impregnated with choler from the bladder of the gaul mixt into the maſs of blood, does participate of an oily volatile ſalt; and ſo by the meeting together of theſe ſomething contrary to themſelves, a gentle and friendly contention or boiling is ſtirred up in the right ventricle of the heart, in which and for which the fiery parts lurking and being ſhut up in each, being freed and ſet at liberty, do rarifie the chyle and blood, and ſo change and alter them, that they exerciſe the function of life and heat as well as motion and nouriſhment through the whole body.* There are many reaſons why I aſſent not to this ingenious and neatly-framed Hypotheſis. For beſides that many do far otherwiſe determine about the origine and diſpenſation of Choler, and ſo not without ſtrong reaſons and experiments are thorowly perſwaded, (by eye-ſight) that there is not any ſuch boiling up of the blood of a different quality, and ſtriving or contending in the right ventricle of the Heart: Our judgment continues ſtill, as it hath been, that both ſtreams of blood, waſhed thorowly with the freſh chyme, do conſiſt altogether of one kind; and for that cauſe the milky Veſſels of the Cheſt carry about part of the Chyle ſo long a journey, which they pour into the deſcending trunk of the *Vena cava*, juſt as the meſeraick Veins pour the other part into its aſcending trunk: alſo that the lymphatic humor together with the Chyle is poured into the ſubclavian Veſſels, ſo that it may very commodiouſly be reduced into blood; neither truly doth there ſeem need of other or more paſſages. Moreover we determine that that humor rightly conſtituted doth agree with, and is eaſily aſſimilated to the maſs of blood, as well as the Chyle it ſelf made ſweet, without any contention raiſed in the heart. But if the lymphatic humor returning from the Brain and nervous kind as well as from the Glandules, degenerate from its due temperature, and contract a ſowreneſs (as it often comes to paſs) then being re-infuſed into the venal blood it overcomes it, and it precipitates it into ſeroſities, and from thence great ſtreamings of urine do enſue. Moreover we have ſhewed elſewhere, that the Diabetes is provoked from ſuch a cauſe. But ſuch a flux of the lymphatic humor is ſo far from exciting a greater boiling up of the blood in the right ventricle of the Heart, that rather on the contrary from thence often chilneſs of the whole or ſtiffneſs, with a weak Pulſe, and ſometimes ſwoonings or convulſive fits are provoked, accompanied with a plentiful and pale urine. The reaſon whereof without doubt is, that then the clear humor flowing from the brain and nervous parts, turns the blood into ſeroſities, and cools it by too much diluting; and for that cauſe the animal ſpirits being deſtitute of their vehicle, either faint or run into irregular motions.

which ſeems not likely to be true.

Our opinion hereof.

The pneumonic circulation of the blood is ſtopt ſometimes by the fault of the heart it ſelf.

But truly as we altogether deny an Elaſtic efferveſcence of the blood in the right Ventricle of the Heart from contention of diſſimilar parts; ſo as often as from thence the blood is not caſt out into the Lungs after a due manner, we determine it to happen not ſo much from the proper fault and defect of the blood it ſelf as from the animal faculty. For if the ſpirits actuating the moving Fibres of the Heart, either grow weary, or are forced into convulſive diſorders; for that cauſe the Heart beating in diſorder, drives out before it the blood either infirmly or irregularly.

2. *Sometimes by the fault of the blood.*

3. *Sometimes by reaſon of paſſages obſtructed.*

But that the blood iſſuing out of the Heart doth not always with expedition paſs through the Pneumonic Arteries, that ſometimes happens from its own proper fault, and alſo ſometimes from the paſſages obſtructed, and alſo by reaſon of other cauſes. The blood it ſelf in a double reſpect hinders its own paſſage through the Lungs, *viz.* either offending as to its kindling, or as to its temperature. There are ſundry accidents of either of theſe. For firſt, even as the blood is more or leſs kindled than is convenient, it is hindred or obſtructed in the pulmonary circuit: if at any time the watry, earthy, or fixt ſaline parts are predominant in the blood, the ſpirit and ſulphur being conſumed or brought low; by reaſon hereof its liquor being not well or leſs kindled by the nitrous air, is not eaſily rarified in the pulmonary paſſage, and ſcarce paſſes through them

them like a flame of its own accord, but it ſticks ſtill in its paſſages, heavy and muddy, and creates much trouble and labour to the Heart whereſoever it is circulated. Hence as often as the blood is a little more plentifully forced into the *Præcordia* by the quicker motion of the whole body, or of its parts, the Heart and Lungs labour hard for its driving about, and that with the utmoſt endeavours. And in this caſe it is probable, that the blood carried more rapidly into the right Ventricle of the Heart, doth ſomewhat ſtagnate; becauſe it cannot preſently be carried into the paſſages obſtructed before it. Moreover from this cauſe thoſe grumous or fleſhy concretions called the *Polypi* of the Heart ſometimes ſeem to ariſe. Hence both in the Pica, Leucophlegmatie, Dropſie, and inveterate Scurvy from the quicker motion of the body ariſes difficult and painful breathing.

The blood hindred in the Lungs ſometimes becauſe not kindled enough;

2. Sometimes the blood is too much kindled, and breaking out almoſt into a flame, and being above meaſure expanded, it can ſcarce be contained in the pulmonary paſſages (which it very much blows up and extends) but endangers them to be inflamed or kindled; wherefore leſt it ſhould tarry longer in them, the *Præcordia* beat with moſt frequent and ſtrong endeavours, that the blood ſo over-much kindled might be ventilated and circulated: for otherwiſe it being carried within the Lungs, and inflaming them all over, would quickly deſtroy the vital function.

Sometimes too much.

Beſides theſe things which concern the kindling of the blood, there are other faults as to its temperament or mixture, by reaſon of which it leſs freely or expeditely is conveyed through the pneumonic paſſages. For when its conſiſtence is either too laxe or too cloſe, it will not eaſily paſs through the ſmall paſſages of the Lungs; but oftentimes is in hazard to ſtick and ſtagnate in them, and alſo run out and be extravaſated.

It is alſo ſtopt through its temperament being vitiated.

The blood being in a diverſe manner made looſe in its conſiſtence, either depoſites its Serum, or its dregs, or its putrefaction in the Lungs; which being lodged in the receſſes of the Veſſels, or affixed unto their ſides, do variouſly ſtop or pervert the courſe of the blood.

1. The diſſolution of blood, which is moſt commonly injurious to the Lungs, (although not very dangerouſly) is wont to happen, for as much as the ſeroſities being unapt to be contained within the maſs thereof, and when they are not preſently ſent away by ſweating or urine, they ſeparate from the blood within the Lungs; and ſo boiling up, and breaking out from their proper veſſels, do as well diſturb and ſtop the paſſage of air, as that of blood; ſo that for the ſake of expelling thoſe ſeroſities and continuation of the circulation of blood, the Lungs are provoked into a frequent and very troubleſom Cough. What the formal reaſon of this Cough is, and the manner of its being brought about, we ſhall declare hereafter.

when the blood is too much looſened in its conſiſtence.

Though there are many cauſes and occaſions, by which the ſerous liquor, departing from the looſned conſiſtence of the blood, flows out abundantly into the Lungs; yet for the moſt part it happens from one of theſe three, *viz.* firſt and moſt frequently, becauſe the Pores outwardly bound up by cold, caſt back the ſeroſities which were wont to be ſent away by perſpiration, into the maſs of blood; which compel it preſently to boil up, and caſt off the ſerous ſuperfluities in the Lungs. From this kind of cauſe Catarrhs and Coughs frequently ariſe, inſomuch that the beginning of every cough by the vulgar is always imputed to ſuch an occaſion, to wit, catching cold. 2. The drinking of ſharp and thin liquors, as Cider, Rheniſh Wine, white Wine, *Paris* Claret commonly cauſes to ſome a Cough, or catarrhal diſtemper: the reaſon whereof is, for that the blood, weak in temperament, is preſently diſſolved and precipitated into ſeroſities like milk by ſowre things caſt into it, which flow plentifully from the mouths of the inward Arteries. I have experimented this upon my ſelf yearly, when in the Summer ſeaſon (when the blood abounds with ſulphur) I have drank Cider and tartiſh Wines ſafely, yea frequently to advantage, the ſame in winter (when the blood is prone to ſowreneſs) but moderately taſted of, do preſently provoke a Cough. 3. There is another cauſe of this ſerous inundation flowing out upon the Lungs, *viz.* when the *Lympha* watering the nervous and ſolid parts, doth ſuddenly ſuffer a flux; and for that cauſe it ſtreams back into the blood out of the Fibres and Glandules, and other paſſages and receptacles; whoſe liquor it preſently diſſolves, and precipitates into ſeroſities, which often infeſts the Lungs.

Why it lodges the Serum in the Lungs.

The various cauſes and ways of doing it.

For this reaſon a ſudden and troubleſom Cough frequently accompanies convulſive diſtempers, which being commonly called a vaporous Cough is aſcribed unto vapours. Moreover in great alterations of air, eſpecially when the ſeaſon varies from dry into moiſt, and the volatile and fixed ſalts do thereby melt, the Cough and Catarrhs increaſe very much.

Neither doth the ſerous liquor only, but alſo many other humors or recrements of the blood lodged in the Lungs frequently ſtuff up their paſſages; ſo that by obſtructing both the paſſages of air and of blood, they cauſe difficult breathing or a cough. This is every where perceived in ill-habited bodies, alſo in Gluttons and Drunkards, and others leading an inordinate and ſlothful life. Wherefore Foot-men uſe a thin and ſpare diet, that they may have their Lungs free from the filth and recrements of the blood. I have obſerved ſome melancholy perſons, the aduſt *fæces* abounding in the pulmonary paſſages, to have voided blackiſh ſpittle like ink; alſo others cholerick, and inclining to the Jaundice to void yellow, and ſometimes very bitter, as if it had been meer choler.

The blood diſſolved alſo lodges in the Lungs infections that cauſe corruption.

3. Moreover many inſtances manifeſtly declare, that ſometimes the Lungs are tainted by the corruption and putrefaction of the blood. For the blood, toucht with an infection or a peſtilent or venemous contagion, begins to be corrupted, and withdraw into clotted and corrupted portions; from thence the Lungs undergo the chief taint, from whence the greateſt danger of life is threatned. This is too well known in the Meaſles, ſmall Pox, Plague, and malignant Feavers, for me now to undertake to explicate it: by which maladies as often as the ſick die, it ſeems to come to paſs, either becauſe the blood clodding in the veſſels of the Heart or Lungs, obſtructs the way of its proper courſe, ſo that preſently its influx into the Brain is hindred, or becauſe the corruption of the blood, affixt to the ſides of the pulmonary paſſages, cauſes a Phlegmon as it were; and therefore provokes a moſt troubleſom cough or difficult breathing, and frequently bloody ſpittle. So much for the impediments of the circulation of the blood, which happen in the Lungs by reaſon of the maſs of blood too much diſſolved, and apt to depart into parts and portions, (which being there left obſtruct their paſſages.) There remain other no leſs prejudices to the *Præcordia*, which proceed from the conſiſtence of the blood too much bound up together, and ſending nothing from it ſelf: by which a burning Feaver, Pleuriſie, or Peripneumony ariſe.

The blood is hindred in the Lungs by reaſon of the too thick conſiſtence of the blood;

As is perceived in a Feaver.

In the former diſtemper the blood being more ſulphureous than it ought, and therewithal being thick, is not diluted enough with its Serum; and thoſe particles of it contained within it ſelf, it puts away with great difficulty: wherefore it is more plentifully kindled in the Lungs; and when it paſſes through the paſſages hereof with more difficulty, by reaſon of its greater boiling, and of its thickneſs, the Heart beating quick and moſt vehemently, endeavours its circumpulſion with all its might; notwithſtanding from its greater flame growing hot within the *Præcordia*, heat and a moſt troubleſom thirſt, with roughneſs, and as it were a certain parching of the tongue ariſes.

In a Pleuriſie and Peripneumony.

In the other kind of diſtemper, *viz.* a Pleuriſie and Peripneumony, the blood is alike thick, but leſs ſulphureous, and inflammable; wherefore it doth not participate of ſuch a burning: yet by reaſon of its thickneſs it doth not ſo eaſily and quickly paſs through the Cheſt or Lungs, is frequently extravaſated, and ſticking to the interſpaces or ſides of the paſſages, cauſes obſtructions, and ſoon after an inflammation, to which pain often ſucceeds with bloody or diſcoloured ſpittle. We may obſerve in blood-letting in theſe kinds of diſtempers, that after it hath ſetled, its ſuperficies is covered with a little whitiſh skin, or otherwiſe diſcoloured, but always with a thick and viſcous: the reaſon whereof is, that the blood, when it doth not ſend away in the circulation its old particles, nor doth admit enough of new, it is thickned with a continual boiling, and like boiled fleſh changed from a bloody colour into a whitiſh; in which ſtate, paſſing with difficulty through the ſmall paſſages of the veſſels, it is in danger to be extravaſated, and eaſily provokes a Pleuriſie or Peripneumony.

The blood is hindred in the Lungs by the fault of the heart.

Beſides theſe ſtoppages of the blood, cauſed by its own fault, while it paſſes through the *Præcordium*, there are alſo other impediments, which happen either by the defect of the Heart, or its paſſages, or by the fault of the air inſpired. By what means and for what cauſe the Heart offending in its motion, forces the blood from its right ventricle through the Lungs into the left irregularly, we have clearly ſhewn in our late Tract of Cardiac Diſtempers: to wit, that muſcle ſometimes labouring for want of ſpirits doth not vigorouſly and ſtrongly enough perform its beatings. For when in corporal exerciſe the blood more plentifully than uſual, is forced from the *Vena cava* into the ventricle of the Heart; if this cannot firmly contract it ſelf, labouring according to its ſtrength, it cauſes frequent and weak Pulſes: moreover to help this, as well the Pneumonic Arteries, as others in ſundry parts of the body, which drive about the blood every way, do cauſe frequent and inordinate contraction. Thus I have obſerved in Virgins afflicted with the Green-ſickneſs, and in other cachectical bodies, from a quick motion of

1. When the ſpirits thereof are wanting.

the

the body, not only a palpitation of the Heart, but in the neck, temples, and other places the Arteries to have beaten irregularly. Neither is it the want of ſpirits only, but their diſorder is ſometimes the cauſe that the *Præcordium* doth with leſs ſtrength convey the blood; for ſometimes the ſpirits, the inmates of the Cardiacal nerves, being ſtirred up by an incongruous conjunction, and affected convulſively, do impreſs their irregular contractions upon the Heart or Arteries, whereby the progreſs of the blood is ſeveral ways perverted or hindred, as it often happens in Palpitation of the Heart, Trembling, intermitting Pulſe, and other the like paſſions.

2. Becauſe moved inordinately.

3. The pneumonic proceſs of blood is variouſly ſtopt, becauſe the paſſages are not open enough: which impediments happen as often as the Pores or thoſe paſſages are either ſtopt or broken. Of the former there are two reaſons, *viz.* ſometimes the ways are ſhut, for as much as the paſſages of the veſſels, contracted by the carneous fibres, are brought nearer one another; as we have elſewhere ſhewed, doth ſometimes happen in Palpitation of the Heart, and a convulſive Aſthma. The affects of which ſort, by reaſon of the ſtream of blood ſhut within the *Præcordia*, difficult or hard breathing, a ſmall Pulſe, and chilneſs of the whole body are wont to accompany. Moreover ſometimes the courſe of the blood is ſhut up, becauſe the paſſages of the veſſels are preſſed together by a body, or by ſome humor from without: wherefore when the little Cells or bronchial Pipes (as is uſual) are filled with a viſcous flegm, purulent matter, or blood extravaſated, as the free paſſage of the air is hindred in them, ſo alſo the paſſage of blood is ſtopt in the veſſels adjoining. On the ſame account come tumors, little ſwellings, worms, alſo ſtony, ſandy, and curdly concretions, and others of another kind are in diverſe manners excited; the chief whereof we ſhall touch on hereafter. Moreover we ſometimes ſee the canals as well of an Artery as of the pneumonic Vein, made very bony in ſome part, and their ſides ſo compreſſed, that a very ſmall chink remains for the blood to paſs. Not long ſince we diſſected a young man who died by reaſon of an ill formation of the pneumonic Vein, in whom the trunk of this veſſel growing ſtony near the juncture to the heart, did ſtick ſo cloſe, that the blood did drop into the heart only by drops, or by a very little ſtream. 2. That the paſſages bringing blood are often filled and ſtopt, inſomuch that the ſtream of blood is obſtructed or ſtraitned, many anatomical inſtances and obſervations manifeſtly declare. From thence it appears, that grumous, or as it were carnous concretions of the blood do frequently ſo ſtop the ventricles of the heart, and the roots of its larger veſſels, that the courſe of the ſtream of blood is almoſt entirely ſtopt. Moreover reaſon perſwades, and experience concludes this more frequently to happen in the leſſer veſſels: for ſeeing (as we have even now intimated) the blood emitted by Phlebotomy in Rheumatiſms, Peripneumonies, and Pleuriſies, when it is cold is covered all over with a thin skin altogether of the like ſubſtance with thoſe concreted Polypus's; it plainly appears, that it paſſes with difficulty through the paſſages of the leſſer veſſels by reaſon of thoſe viſcous excrements: wherefore that it may paſs by ſome means, it diſtends them very much, and ſometimes breaks quite through them, alſo it frequently unlocks their mouths, and opens gaps into the *Trachea*, inſomuch that portions of the extravaſated blood are by coughing frequently ejected. We have known ſome to have died Aſthmatic or ſhort-winded, whoſe Lungs being free from an Ulcer, or any more grievous wound, have ſwelled ſo much, that they wanted room for their motion within the cavity of the Cheſt: the reaſon whereof doubtleſs was, that the thicker and more feculent blood, for that cauſe not eaſily paſſing through thoſe veſſels, every where extended the Arteries and Veins, and cauſed it to ſtagnate in the leſſer Pipes. Moreover the feculencies of blood one while ſalt of different kinds, another while ſulphureous or earthly being combined with them, and thruſt into the ſmall paſſages of the veſſels, and fixed there, do altogether obſtruct them; inſomuch that the pneumonic circulation of the blood is contracted into a ſhorter ſpace, and conſequently the function of breathing is ſtraitned in the compreſſed Pipes or little Cells. There are many kinds and ſundry ways of ſuch an obſtruction, which if all or the chief ſhould be enumerated, ſuch a Pathology would ſwell into a too great bulk.

3. The blood is hindred from obſtruction of the paſſages. Which are ſhut up divers ways. For divers cauſes here rehearſed.

The bronchial Pipes are filled.

Sometimes wax hard.

The veſſels are ſtuffed with concretions reſembling the Polypus.

3. The pneumonic paſſage of blood is not only hindred by reaſon of the paſſages ſhut and obſtructed, but ſometimes alſo being burſt aſunder. For thoſe veſſels being ſmall, or tender, or very looſe in ſome perſons, are frequently opened by the force or acrimony of blood; ſo that the blood either burſting into the *Trachea*, is ejected by ſpitting, or heaped up in the interſpaces of the paſſages, cauſes a Peripneumony, or falling down into the cavity of the Cheſt, produces an Empyema. Of all theſe we ſhall treat ſingly in the Chapter of ſpitting of blood.

The blood is alſo hindred becauſe the paſſages are burſt aſunder, as in ſpitting blood.

One impediment of the blood is want or default of air.

3. There remains as yet a third impediment of blood in the pneumonic paſſages, which happens for the want or fault of Air. If at any time the Blood is not kindled after a due manner within the paſſages of the Lungs, from air breathed in by the *Trachea*; for that cauſe as preſently its flame is irregular, ſo likewiſe its motion is variouſly ſtopt or perverted: for although the blood is forced through the lungs by the meer impulſe of the heart, notwithſtanding the pulſe hereof is proportioned according to the tenour of its being kindled by the air; wherefore when the flame of blood is diminiſhed, or ſuppreſt, for want or through the fault of the air, preſently the pulſe proves languid or unequal, and by reaſon of the bloods courſe being troubled, or ſtopt, preſently a paleneſs and coldneſs ſucceeds throughout the whole body, with enervation of the members. But if inſpiration be wholly intercepted or fruſtrated (becauſe the nitrous particles are wanting) preſently the pulſe ceaſes, and anon life is loſt. The reaſon of all which is, both becauſe the blood being much impeded in its accenſion, or extinct, like Muſt given over working preſently ſubſides, and is unapt for any motion; and chiefly becauſe the flame of the blood failing, and being ſubſtracted from the brain, preſently the Hypoſtaſis of the animal ſpirits, as it were light ſtreaming from thence, immediately fails, and together with it the exerciſe or actions of all faculties do ceaſe. But if the blood is too much kindled, the Sulphur of the Blood, and the Nitre of the Air running together more than it ought; for that cauſe preſently, that this too much burning may be eventilated enough, the pulſe of the heart is increaſed to its utmoſt. We might adde many inſtances of this kind; but truely this conſideration of the blood leads us to the ſecond thing propoſed of Reſpiration hurt; namely that we may duely weigh, what ſort of failings or defects do happen about the inſpiration as well as expiration of the Nitrous air, requiſite for the preſerving the nitral flame of blood; that is to ſay, from what cauſes they proceed, and alſo what effects they are wont to produce; in which ſearch we will firſt treat of Inſpiration hurt.

SECT. I. CHAP. III.

Of Inſpiration hurt.

Breathing hurt by the vicious qualities or defect of air.

The faults of the air.

BReathing is accounted hurt, when its uſe is fruſtrated, or any ways hindred; which moſt frequently happens, by reaſon of the fault or defect of the Air drawn in. As to the former, if the Air chance to be depraved, it neither duely kindles nor eventilates the blood, yea it ſometimes overthrows the temperament thereof, or infects it, as is every where ſeen in a Conſtitution of Air very malignant. That we may touch on the chief reaſons of theſe diſtempers, we are to obſerve, That as the Nitrous particles of Air are chiefly neceſſary, (as is manifeſt by manifold experiment) for the preſervation of life; ſo frequently it happens that Nitre of the Air either to fail or be wholly wanting, or by particles of another kind to be ſo much muffled, or bound up, that they cannot enough exerciſe their vital power; or laſtly, malignant or fatal Corpuſcles to be adjoyned thereunto. Firſt, the nitrous particles of Air are deficient, if when it ſtagnating or growing hot the Nitre is chaſed thence, or not ſtirr'd into action. Wherefore, in a low-rooft Chamber, or too cloſe, and in other places crouded with aſſemblies of men, or made hot with the ardor of the Sun, we difficultly or weakly breathe. The ſame comes to paſs in places of great height, on the tops of thoſe mountains exceeding the top of the *Atmoſphere*; wherein breath is faintly drawn for want of Nitre, neither can we live long there. Secondly, the Nitrous particles of Air are wont to be obſcured or blunted by other acceſſories, alſo ſometimes they are too much ſharpened. For as often as the South-wind blows, the Air is too moiſt and thick, inaſmuch as the Nitrous particles are ſeiz'd upon by the watry and ſulphureous, and are much blunted, ſo that while it is drawn in, the blood is not vigorouſly kindled, but like green wood put into fire it rather ſmokes than burns bright; wherefore during ſuch a ſtate of Air we become ſtupid and dull, and unapt for motion; but on the contrary, the North-wind blowing, the cooling, ſharp and moſt nipping particles are adjoined to the Nitrous, and the blood is enough kindled, and we breathe freely; yet the Vital flame is every where reſtrain'd by intenſe froſt diſproportion'd thereunto, and unleſs refreſh'd by motion and heat, it is frequently entirely extinguiſhed.

2. Be-

2. Beſides theſe faults of the Air, whereby breathing is wont to be hurt, moreover this evil ſometimes proceeds from its defect; inaſmuch as it cannot be drawn in in plenty enough. Of which effects though there are many and divers cauſes, yet for the moſt part it happens in reſpect of the organs of breathing, either hindred as to their motion, or their paſſages obſtructed.

The defect of air hurting breathing, proceeds from the pneumonic Organs.

1. The Organs of breathing are either meerly paſſive, *viz.* which are moved, as the Lungs; or are Active, and move themſelves, and thoſe together, as the muſcles of the Cheſt and Diaphragma. In every of theſe the impediments of the motion by which breathing is hurt, happen variouſly. And firſt what reſpects the Lungs, we mentioned before, that they ſometimes very much ſwell, by reaſon of the veſſels being much diſtended, and fill'd with blood, inſomuch as being ſtiffe and inflexible, they obey not the turns of the Syſtole and Diaſtole of the Cheſt. Moreover it happens ſometimes through a phlegmon, little ſwellings, and other concretions of divers forms, that a like ſtiffeneſs is cauſed in them. Secondly, the active organs of breathing, or the moving parts, *viz.* the muſcles of the Cheſt and Diaphragma are wont to be perverted or ſtopt from their moving function by divers cauſes. A ſolution of continuity made in any part of theſe, either by clotting of blood, or by falling down of the *Serum*, and other humors, as in the Pleuriſie and Scurvy, or in thoſe that are wounded or bruiſed, doth every where cauſe pain in the place affected, with impotency of motion and difficult breathing. Moreover, ſometimes without pain, or any evident cauſe, thoſe parts being hindred from their motion do produce a moſt heavy purſineſs; As is frequently ſeen in an Aſthma, Suffocation of the womb, and in certain other convulſive or hypochondriac diſtempers. The reaſon of which paſſion without doubt conſiſts in this, for that the animal ſpirits appointed to the moving function of thoſe parts, are diſturbed about their Origine, or hindered in the paſſages of the Nerves, and are turned aſide from their due influx into the moving fibres: Inſomuch as many who are ſound enough as to their Lungs, and only obnoxious to affects of the Brain and Nerves, are frequently ſurprized with horrid fits of an Aſthma, as we have at large declared in another place.

2. The ſtopping of air, hindering breathing, whereby it leſs freely enters the Lungs, frequently happens, by reaſon of the Conveyances, *viz.* the paſſages of the *Trachea* being ſhut, or not enough open. For indeed thoſe paſſages are wont to be ſtopt (as we have formerly obſerved touching the Veſſels bringing Blood) and prohibit the full entrance of air, when they are either obſtructed or compreſſed, or more narrowly contracted. Though there are many cauſes and wayes whereby the paſſages of the *Trachea* are wont to be obſtructed, yet chiefly and moſt often a Catarrhal diſtillation of the *Serum*, while it departs from the blood, and flows out of the veſſels bringing blood into theſe parts; which being firſt thin and ſharp, produces a troubleſome Cough; afterwards thickening by digeſtion, and cleaving to the ſides of the *Trachea*, exceedingly ſtraitens the ways of inſpiration, and ſhortens them by quite ſtuffing up their extremities. In like manner the ſweating out of extravaſated blood, as alſo of *Pus* or ichorous matter out of the Lympheducts or Veins into the tracheal little bladders, doth frequently produce an Aſthma, and often a Conſumption; the reaſon of which ſort of diſtempers ſhall be more largely explained hereafter. Secondly, it is manifeſt enough by common obſervation, that the Tracheal paſſages as well the laſt as the intermedial, often-times are ſtraitened, or ſhut, by compreſſion. For after a plentiful meal, or abundant drinking of Wine or ſtrong Ale (inaſmuch as the pneumonic veſſels are very much diſtended by reaſon of the turgency of blood, and the ſides of the Trachea being preſs'd together, do not admit of a free and uſual entrance of air) men otherwiſe healthful enough, do breathe difficultly and painfully: Which truely we eſteem to happen from the lungs being filled and extended rather, than from a cram'd ſtomach hindering the Syſtole of the Diaphragma. Moreover, for this reaſon, even in the very paroxyſmes of feavers a frequent and painfull breathing is manifeſt. Neither onely from the turgency of blood, but alſo from the ſame ſtagnating, or extravaſated, and alſo from ſtony concretions, and divers other manners, the veſſels of the Trachea being preſſed together, cannot diſcharge a free breathing.

The various ways of Obſtructions.

A Catarrh.

The ſwelling of blood by which the paſſages are preſs'd together.

3. The paſſages of the Trachea being ſometimes more nearly contracted and cloſed from their fibres convulſively diſpoſed, deny a paſſage to the Air for due breathing. From hence, when there is no obſtruction, or ill conformation in the lungs, as alſo no conſumptive diſpoſition, yet from thoſe fibres preternaturally convulſed and drawn together, dreadfull fits of an Aſthma frequently ariſe. Whereas we have in another place

The cramps of the tracheal paſſages

place diſcourſed of theſe paſſions, it will not be requiſite here again to repeat that diſcourſe. Beſides theſe accidents of breathing hurt, there are certain others which are ſtirr'd up by reaſon of the Air prohibited in its firſt entrance, *viz.* in the Noſtrils, the throat, the *Larynx*, from a tumour or ill conformation: For the *Polypus* in the Noſe, the Quinzy in the Throat, or inflammation of the Tonſils, do render a difficult breathing; in the ſame manner as a heap of ſand about a Haven, obſtructs the ingreſs and regreſs of Ships. But truly ſince the reaſons of thoſe paſſions, and their manner of being made, are expoſed to ſenſe, it ſeems ſuperfluous here to deliver their cauſes.

SECT. I. CHAP. IV.

Of Expiration hurt.

The act of expiration is eaſier than of inſpiration.

AS Expiration is much eaſier, and with leſſer trouble performed than Inſpiration, ſo it is leſs endangered to be ſtopt or perverted, as to its function: for in truth the contractive endeavours of fewer muſcles are required to perform that, inſomuch as ſome do affirm that the meer relaxations of the moving parts, whereby the dilatation of the breaſt is diſcharged, doth ſuffice for its conſtriction. Hence when in the agony of death, the ultimate labour is to open the breaſt, and fetch breath, by which the flame of life may be continued; as ſoon as that endeavour is become fruſtrate, the animal exſpires, and is readily extinct. But truly we have already clearly enough evinced, that the tasks of breathing out, no leſs than thoſe of breathing in, are performed by the help of peculiar muſcles. Wherefore, when it happens that the Organs of Expiration are either hurt or prejudiced, there muſt needs follow difficulty or depravation of that function. The moving parts, which bind together the breaſt, and ſtraiten the cavity thereof, are eſpecially the inward muſcles of the breaſt, ſome belonging to the Loyns, and others to the Abdomen; as alſo the muſcular fibres of the *Larynx* and *Trachea*; by reaſon of ſome faults, occupying ſometimes theſe, anon them, either ſingle or many together, exſpiration is wont to be ſtopt or perverted after a diverſe manner. Although the hurt of this function frequently depends upon inſpiration being prejudiced; notwithſtanding it ſometimes happens alone; ſo that when we ſuck in Air eaſily and duely enough, we return it diſturbed or perverſly, which truely is wont to come to paſs through divers cauſes, and after many manners (the chief of which we ſhall here briefly touch upon.)

Expiration hurt ſometimes proceeds from the fault of inſpiration.

Sometimes being alone depends on various cauſes.

1. On the wound of a part moving.

1. For firſt, when a wound, or convulſive or paralytical diſtemper happens in one muſcle (which cauſes exſpiration) or in more, for that cauſe the cavity of the *Thorax* cannot be ſo freely drawn together and compreſs'd, for the more full breathing out air or breath. Hence not only ſuch as labour in a Pleuriſie, but in a tumour or wound in the intercoſtal muſcles or the Abdomen, cannot eaſily cough, or ſing, or perform other acts of ſtronger expiration: Neither is the due drawing together of the *Thorax* leſs ſtopt, by reaſon of the moving fibres of thoſe parts affected either by a reſolution, or a cramp.

2. In a Cough.

2. The act of expiration, whereas it is variouſly perverted or diſturbed, ſo it chiefly happens in a cough, in ſneezing, in laughing, in crying, and in Hiccough; into the reaſon and manner whereof we will briefly enquire; And firſt we ſhall ſpeak of a Cough.

The deſcription of a Cough.

A Cough may be deſcribed, that it is a vehement, more frequent, unequal and loud expiration, ſtirred up either for the quieting of ſome troubleſome and provoking thing, or for expelling of it out of the Lungs through the paſſage of the *Trachea*. For air being violently excluded, and daſh'd in the way on the ſides of the Tracheal paſſages, whatſoever is in any place impacted in them, if it be eaſily moved, it diſcuſſes and wipes it away, and frequently ſends it out of doors.

Its formal reaſon and the manner of its being done.

For the exciting of a Cough, both the muſcles contracting the *Thorax*, and alſo the moving fibres of the *Bronchii*, do concur in motion with a joynt force together. For while the muſcles ſtraiten the cavity of the breaſt, and every where ſqueeze the whole lungs; theſe fibres one while contracting theſe tracheal paſſages, another while them, cloſing behind the air while it is driven forwards, do endeavour its expulſion more quick and vehement.

A more intenſe ſudden inſpiration precedes every act of a Cough, to wit that the air being admitted in greater plenty, may preſently be more violently driven out with noiſe; in which endeavour not onely the new that is freſh breathed in, but alſo the old, being heaped up before in the tracheal little bladders, is driven forth together with a noiſe, for the encreaſe of breath blown out; and when what is troubleſome is not ſettled nor removed at the firſt aſſault, the vehement exſpiration of this kind is repeated by a frequent courſe, even to the great wearying of Nature.

Its primary cauſe.

The firſt cauſe of every Cough is an irritation of the nerves or fibres belonging to the lungs; concerning the nerves we are to obſerve, that not onely the branches and their ſlips inſerted into the Lungs, but others from which they do ariſe, or with which they do intimately communicate, being provok'd in places far diſtant from the breaſt, immediately cauſe a cough: for which cauſe oftentimes a ſharp humour being lodged within the Brain, and from thence falling down into the little head of the pectoral nerves, is wont to produce a moſt troubleſome Cough or Aſthmatick diſtempers, as not long ſince we have declared by notable inſtances. For the ſame reaſon a pain inflicted on the noſtrils, palate, or *Gula*, provokes a Cough, or rather a vain attempt of coughing. Moreover a little *Serum* diſtilling from the Arteries into the upper parts of the *Gula* or *Larynx* produces a frequent and very troubleſome Cough, without any notable prejudice of the Lungs. But truly this provocation, inflicted on the nerves and fibres diſtributed in the Lung it ſelf, more frequently, and truly more violently provokes an endeavour of Coughiug, which is repeated by courſes, till what is troubleſome be turned forth, or the provocation reſtrained. Of this kind of Cough from the nerves, a notable Example ſhall be after ſet before you.

The evident cauſes thereof.

The provoking cauſes producing a Cough are manifold, and make their ſtay in ſeveral places: for beſides that the nerves, as we but now intimated, and alſo the membranes, with which there is an intimate communication with the Lungs, being provoked in the open Noſtril, give an impreſſion of that paſſion at a diſtance to the Lungs; moſt frequently that irregular exſpiration is ſtirr'd up, by reaſon ſome incongruous or in ſome meaſure unproportion'd thing is caſt into the Lungs. For in the firſt place, that this troubleſome thing may be removed, the nerves and the nervous fibres diſperſed about the Lungs are irritated; afterwards by the conſent of theſe, the muſcles of the breaſt that draw it together, and the moving fibres of the Trachea at once are forced into vehement and often repeated contractions.

The kinds thereof.

Every Cough is either moiſt or dry; in the former a certain humour being depoſited in ſome place within the tracheal paſſages is ſhaked by coughing, and being to be thrown out upwards is caſt into the mouth. That humour, whereas it is manifold and after divers ſorts, for the moſt part it is either call'd ſerous, or nutritious, or purulent, or bloody.

Of the former there are many kinds and differences; namely, as to its conſiſtence it is either thin, or thick, or crude, or digeſted; as to its colour, it is either white or yellow, or ſomewhat greeniſh; alſo ſometimes it is blewiſh, or black. Moreover, a moiſt Cough is variouſly diſtinguiſhed, as to the places from whence the humour to be coughed out proceeds. For ſometimes cleaving to the ſides of the *Larynx*, or ſweating from them, the moving fibres being ſhaken by a gentle little Cough, it is eaſily and by a ſhort paſſage caſt forth into the mouth; ſometimes the matter to be excerned, being impacted a little deeper in the pipes of the *Bronchii*, is not ſhook out but by large expirations, and often repeated; and laſtly it ſometimes happens, that the excrements to be caſt out, are depoſited within the fartheſt little bladders of the Trachea, out of which it is not brought forth without a vehement labour of coughing, and that frequently repeated, and at laſt driven forth by a long journey through the whole lungs. Concerning the Cough of a nutritious humour, as alſo of a bloody and purulent, hereafter it ſhall be diſcourſed when we treat of a Conſumption and its remedy.

A moiſt Cough.

A dry Cough.

A dry Cough, as often as it is the proper paſſion of the Lungs, is excited after many manners and by ſundry cauſes; for an obſtruction of any of the pneumonic paſſages, whether it be by compreſſion, or oppletion, or contraction, doth neceſſarily induce this. Wherefore an inflammation, a tumour, a little ſwelling, a ſtagnation of the blood either through plenty or ſcarcity, alſo gravelly, ſtony, or polypoſe Concretions, worms and many other preternatural things, inaſmuch as they almoſt perpetually provoke the nervous fibres, do induce a dry, vain Cough, but very troubleſome. But

a dry Cough ſometimes is ſtirr'd up by the inſtinct of Nature, as in place of a Pump; to wit, that the blood either by reaſon of its proper ill temperament, or by reaſon of the pneumonic Veſſels not being open enough, not paſſing well through the lungs, may be promoted by the ſhaking of theſe parts, and forced into a more rapid motion.

What belongs unto the other acts of expiration hurt, as when in ſneezing, hiccough, laughing, crying, and in other affects its natural and even function is troubled or perverted; ſeeing the rendrings of the cauſes of theſe (which alſo in another place we have in part deſigned) do not properly appertain to our purpoſe, omitting them here we will paſs to the thing chiefly deſigned, *viz.* to the diſeaſes of the breaſt and their remedies, and to the reaſons of curing them.

SECT. I. CHAP. V.

Of a Phthiſis or Conſumption in general.

WHereas we have hitherto viewed the fabrick of the Lungs accurately delineated, and the motion thereof together with that of the whole Breaſt, and the ways and paſſages of the air, and of the blood, and of other humors through them; and have alſo obſerved their various impediments, their remora's, or diverſions, according to which it happens the act of the pneumonic function is after a diverſe manner hurt or perverted in inſpiration and expiration: now in the next place we are to deſcend to the Pathology of this region ſo travelled over, and, which was our deſign from the beginning, to treat of Medicines belonging to the *Thorax*, or Remedies appropriated to heal the diſtempers of the Breaſt, and the manner of their operation.

A Phthiſis accounted chief among the diſeaſes of the breaſt.

Of all the diſeaſes of the Breaſt a Phthiſis, or Conſumption, by right claims the firſt place: for there is none more frequent or difficult to cure. Moreover all the other affects of the *Thorax* being ill, or not at all cured, do lead into this, as leſſer ſtreams into a greater Lake, and ſo ending in a Phthiſis, loſe both their natures and ancient names.

The various acceptation of Phthiſis.

But truly theſe terms of *Phthiſis* and *Tabes* in their proper ſignification denote an Atrophy, or a withering away of the ſolid parts with debility of ſtrength: the diſtempers of which ſort frequently proceed from a wound or Ulcer of the Lungs; notwithſtanding ſometimes without any fault of theſe, the extenuation or pining away of the whole body takes its riſe from the meer fault of the blood, or chiefly from the nervous juice. Therefore before we handle a private pulmonary Phthiſis, ſeems to our purpoſe to explain the general reaſons of this ſickneſs, and to declare how many ways, and from what cauſes the ill temperaments of the humors are wont to induce a privation of nouriſhment of the whole body, as it were conſumptive. For truly the Conſumption of the Lungs it ſelf doth not next and immediately proceed from an Ulcer or corruption of that bowel; but it ariſes for as much as the blood from them contracting a corruption, and highly defiled, for that very cauſe loſes altogether its nutritive virtue. Moreover as well this as the nervous liquor acquires ſuch an indiſpoſition. Of which in general we will now inquire.

It denotes any Atrophy.

An Atrophy firſt depends on the blood made unfit to nouriſh.

And firſt what relates to the Blood, we may often take notice, that ſome pine away without a Cough, or without any apparent fault either in the Lungs or Breaſt; in the mean time as to appetite, digeſtion, ſleep, and almoſt the œconomy of the whole natural and animal function do carry themſelves indifferent; notwithſtanding, as if nouriſhment ſhould be poured into a Receptable bored through, they are not nouriſhed, but pine away ſenſibly maugre all Dietetical Rules. The formal or conjunct reaſon of which kind of affect frequently conſiſts only in this, that the blood being notably depraved, cannot aſſimilate the nouriſhing juice continually mixt with it; wherefore it doth not only forthwith ſend it away, but alſo takes away ſome particles of the ſolid parts; which ſnatching to it ſelf, it preſently throws out, or caſts it into ſome place or other, or conſumes it by evaporation.

The depravations or degenerate ſtates of the blood, that are wont to induce an Atrophy, either conſiſt in its proper diſtemper, or themſelves are communicated from ſome other place, and indeed chiefly from the bowels, or from the nervous liquor being alſo degenerate.

The

The proper Dyſcraſie of the blood it ſelf is twofold, according to which it happens, that the ſaline-acid particles or the ſulphureous and moſt ſharp are exalted above meaſure, and predominate over the reſt. For ſometimes the blood withdraws it ſelf from its genuine diſpoſition, *viz.* a ſweet and volatile into an acid, as is always found in ſcorbutical, melancholy, or cachectical perſons. Wherefore the nutritious juice being ever mingled with the bloody maſs, ſeeing it cannot for that reaſon be aſſimilated, and affixed to the ſolid parts, is releaſed again in a ſhort time; and is either forthwith ſent away by urine, ſweat, or a Diarrhœa; or being pen'd up within the fleſh or cavities of the bowels, brings a Dropſie: of which ſort of diſtempers, being led forth into an evil ſtate, the ordinary effect is wont to be, that when ſome parts do ſwell very much, other parts are very much extenuated. Here it would be far from our purpoſe to deliver the true cauſe of the above-mentioned affects, and to put our ſickle not only into another mans harveſt, but alſo one far remote. 2. Moreover there is another ſtate of blood unfit for nouriſhment quite contrary to this, to wit, when being above meaſure hot and ſulphureous, and from thence always violently burning out, it conſumes the nutritious juice by its effervescence and raging, and cauſes it too much to evaporate; ſo that the ſolid parts being defrauded of their proviſion pine away. The perſons obnoxious to this diſtemper have large veſſels, and much diſtended with blood, but their fleſh withered and hardned by heat. Though perſons ſo affected ſeldom pine away to death, yet they grow old ſooner, and end their life in a ſhorter ſpace.

The conſumptive Dyſcraſie of the blood either from it ſelf or communicated from other parts.

1. *The kinds of the former are reckoned up.*

2. The blood not only from its proper *indoles*, but alſo by reaſon of a Conſumption elſewhere, and chiefly communicated from the bowels and nervous juice, is often unfit to nouriſh. And firſt this frequently happens by fault of the bowels; for theſe being ill-affected, ſometimes do not duly digeſt the Chyme to be conveyed over to the blood; alſo oftentimes they pervert and defile it with their extraneous and heterogene ferments, inſomuch that the functions are fruſtrated in the faculties of breeding good blood and nouriſhment. Moreover ſometimes by reaſon of the Veſſels bringing the Chyle obſtructed within them, though much be eaten, yet little or leſs than due, is conveyed into the bloody maſs. Alſo in the bowels of concoction ſometimes Tumors, Impoſthumes, and Ulcers happen; from whoſe corruption the blood being infected in its paſſage, contaminates the reſt of the maſs, and renders it unapt to the work of nouriſhing. How often do we ſee from a Schirrus happening in the Spleen, Liver, Pancreas, or Meſentery, or by an Ulcer or cancrous Tumour of ſome Gut, as alſo of a Kidney, Womb, or Bladder, or otherwiſe malignant Sore, a deadly Atrophy to have ſucceeded without any notable fault of the Breaſt or Lungs? Yea Tumors, Impoſthumes, or cancrous and ſtrumous Ulcers happening in the outward parts, and eſpecially in the Back, do frequently end in a pernicious Conſumption. The reaſon whereof is plain, *viz.* in as much as in ſuch diſtempers both great plenty of the nutritious juice brought to the affected part through the Arteries, is either entirely beſtowed in the ſame place, or from thence is poured forth abroad, inſomuch that all the other parts of the whole body are defrauded of their due proviſion; as alſo that the virulent or very incongruous matter there engendered and lodged is ſwallowed up by again the Veins, which defiles the blood by an impure black gore, and from thence renders it altogether unapt to diſcharge the faculty of nouriſhing.

This proceeds ſometimes from a fault of the bowels or ſolid parts;

Neither only from the bowels and ſolid parts, but alſo from the nervous juice the ſtain (by which it becomes unfit to nouriſh) is frequently communicated to the blood. For when this liquor degenerates from its genuine temper, to wit, ſweet and volatile into an acid, preſently flowing out of the fibres and nervous parts, and flowing back into the blood, it doth precipitate the liquor thereof, and compels it into fluxes, whereby all the nutritive matter is caſt forth, and one while poured forth by Urine or Sweat, another while by Vomit or Looſneſs. The reaſons of all theſe, and how they come to paſs we have explicated in a late Treatiſe.

Or from the nervous juice.

But the nervous liquor, ſometimes by it ſelf, departing from its good temper, and being vitiated in its temperament, is a cauſe of want of nouriſhment, which alſo happens to be made in a twofold reſpect, or two manner of ways. For ſometimes that Juice being very much vitiated and degenerate, proves as it were vappid and decayed; ſo that it doth not actuate enough the fibres as well nervous as carnous, and inlighten them with an animal ſpirit: wherefore as the motive virtue, ſo alſo the nutritive fails in the ſolid parts. From hence either the entire body, or certain members and parts thereof being for ſome while affected with a Palſie, at length they wither away: as we have at large declared the reaſon thereof in another place. 2. We have

The nervous juice ſometimes of it ſelf is chiefly the cauſe of an Atrophy.

alſo obſerved, that many labouring with a ſlow Feaver (or as called by us a nervous) do preſently languiſh, and in a ſhort time become much emaciated. In either caſe the ſame reaſon ought to be aſſigned; for, as is ſhewed in another place, ſeeing the animal ſpirits, together with the nervous liquor, their vehicle (which is as it were the maſculine ſeed) do actuate the nutritive humour every where collected by the ſolid parts even as the feminine ſeed, and render it as it were pregnant with a nutritive faculty; for that cauſe if that nervous liquor becomes either depraved or vappid, the bulk of the ſolid parts pines away as if it were made barren.

Two chief kinds of Atrophies.

So much of theſe things touching an Atrophy, or waxing lean, and the formal reaſons thereof, the cauſes and various manners of its coming to paſs in general. Of this diſeaſe as there are many kinds and differences, ſo two chiefly and more obſervably occurr, whereof either will deſerve a particular conſideration; *viz.* *Tabes* or *Phthiſis Dorſalis* commonly ſo called, and a Conſumption of the Lungs. This latter, which properly belongs to this place, ſhall be diſcuſſed in the following Chapter; in the mean time concerning that (becauſe the knowledge thereof doth illuſtrate the Pathology of this) we ſhall ſpeak in a word.

Tabes Dorſalis.

Two kinds.

Tabes Dorſalis, although it hath almoſt loſt its name in this our Age, or perhaps changed it into a Gonorrhœa, yet *Hippocrates* makes mention of it, and handling it avowedly, he aſſigned a twofold kind thereof, *viz.* one from immoderate Venery, and the other from a deſtillation into the Spine of the Back. What relates to the latter, I have often obſerved ſome to be moſt grievouſly vexed with a pain about their Loyns, yea ſometimes in the whole Back, which when for ſome time ſome have ſo laboured under, they afterwards come to be lame or crooked, and at laſt fall away in the whole body, all but the head. The cauſe of which diſeaſe doubtleſs conſiſts in this, *viz.* firſt a humour or a certain incongruous morbific matter, deſcending with the nervous juice through the ſpinal marrow, did run into the branches of the vertebral Nerves, and therefore from the beginning, by reaſon of the Fibres being twitched, a continual pain almoſt did ariſe; afterwards by reaſon of ſome Fibres being reſolved, the oppoſite ones more vehemently contracted diſtort certain Vertebra's of the Spine; and laſtly ſeeing the animal Spirits cannot actuate enough the Nerves and Fibres belonging to the trunk and members, by reaſon of the nouriſhment fruſtrated, the withering of the entire body ſucceeds. Surely when the nervous liquor and animal ſpirits paſs not fully and freely out of the Dorſal Spine into the whole body, from thence oftentimes a pining doth ariſe: hence Impoſthumes and Ulcers ariſe about the Loins or the *Os ſacrum*, which in as much as they conſume or pour forth the nervous liquor too much, cauſe an Atrophy in the whole, or at leaſt in the lower parts.

From the nervous juice ſlept or depraved in the loyns.

2. Another kind of *Tabes Dorſalis* far more frequent, is alſo twofold: *viz.* it either ariſeth from the great or too-often loſs of the genital humor, or from a continual corrupt flux from the genital parts.

From the expenſe of the humour through the genital parts.

That humour is firſt either ſeed, a too great expence whereof induces an Atrophy.

1. As to the firſt, it is manifeſt by vulgar obſervation, that the immoderate uſe of Venery, yea involuntary efflux of the ſeed, if it be either great or continual, produce a faintneſs in the whole body, and at length a pining away. The reaſon of this (as we have intimated in another place) is not, that the ſeed, according to the opinion of ſome, deſcends from the Brain through the Nerves into the ſpermatic bodies, and from thence, by reaſon of a great loſs thereof firſt the Brain, and then the parts, all depending on the influence of the Spirits ſpringing from thence, become infirm and pine away. But ſeeing we have ſufficiently evinced, that the ſeminal matter is immediately ſupplied out of the maſs of blood into the genital parts, and that it is altogether the ſame with that out of which the animal Spirits inſtilled into the Brain are procreated, it will neceſſarily follow, by how much the greater portion is got to the Teſticles for repairing the loſs of ſeed, by ſo much is the Brain defrauded of its due ſhare, and therefore at length the function in the whole body, as well motive as nutritive, doth waver and diminiſh. Our furious Whoremongers are ſenſible of a great debility about their Loins, and the parts placed below them, to wit, the Thighs and Legs, do chiefly wither away; the reaſon is, becauſe as well the proviſion of the animal Spirits in its firſt ſpring, *viz.* in the Brain failing, the outmoſt chanels, *viz.* the ends of the ſpinal marrow, and the Nerves ſpringing from it, do ſuffer firſt and chiefly for this defect; and moreover becauſe near the Loins the arterious blood gives out to the Teſticles more excellent particles and chiefly reſtaurative, being deſtined to nouriſh the Back, and in the mean time the venous blood being for that cauſe decayed or conſumed, is enfeebled, and ſteals from the Loins as much as poſſibly may be.

The loſs of the ſeed cauſing a Conſumption is ſometimes voluntary, of which ſort the ſalacious and prone to Venery do ſuffer: ſometimes involuntary; of which affects there are divers kinds. For in ſome it only happens by dreams or obſcene phantaſms; but in others, beſides thoſe occaſions, every endeavour of the Back, whether through bearing a weight, or excretion of Urine, or the *fæces* of the Belly, cauſes the genital humor to be thruſt out: the cauſe whereof is, both becauſe the ſeed is watry and thin and at once ſharp and provocative, alſo becauſe the parts are weak, and not able duly to digeſt or retain it.

The loſſes whereof are voluntary or involuntary.

In the other *Tabes Dorſalis* above-mentioned, not the ſeed it ſelf, but an ichor or a certain putrilage is caſt out abundantly from the genital parts; the efflux whereof, if it be great and continual, doth frequently impair the ſtrength of the whole body, and by withdrawing and prodigally removing the nutritive matter, it induces an Atrophy or conſumption. For near the ſpermatic Veſſels, or in paſſage from them, as well in men as women, there are certain Emunctories placed, whoſe faculty is to receive the ſuperfluous humour from the ſeed formed, and when it abounds to ſend it abroad through the genital parts. For this cauſe that thoſe paſſages in either Sex may be made ſlippery and moiſt (leſt they grow dry, and become leſs ſenſible) the Proſtates in men and the Glandules about the horns of the womb in women are conſtituted; out of both which always in the act of coition, and ſometimes without, when the ſpermatic bodies abound with too much moiſture, a certain ſerous liquor ſweats out: and in women (whoſe bodies are more moiſt, and in whom Nature hath made theſe ways for their menſtrual excretion) this doth oftner and more plentifully happen than to men. But if theſe Emunctories be affected with a great debility, or a certain virulency, ſo that they corrupt this liquor ſent, or do not retain it enough, it is not only ſent away inceſſantly, and flows out plentifully through the *Pudendum*, but alſo other ſuperfluous humours or recrements of the whole body flowing together to thoſe weak parts are thrown forth together. Alſo the nutritious Juice deſtined to the neighbouring parts flows thither, and preſently goes out together; ſo that at length by reaſon of the loſs of the nutritious Juice (which flowing to the ſame place is corrupted and continually ſent away) not only pains of the neighbouring parts, but of the whole body, and a pining doth ſucceed. Theſe things are commonly known in a Gonorrhœa, alſo in *fluore muliebri*, or thoſe affects from an impure bed, or immoderate Venery, or are cauſed by a blow, a bruiſe, violent exerciſe, or any other hurt inflicted upon the Loins. It is not proper to this place to deliver particularly the true rendring of the cauſe and curatory method of healing of this ſort of paſſions: we ſhall proceed to treat of a *Phthiſis* or *Tabes* properly ſo called, *viz.* which ariſes from the only or chief fault of the Lungs, which was the buſineſs of our deſign.

2. Or Ichor flowing into thoſe parts from ſolution of continuity.

The formal reaſon of a virulent Gonorrhea.

SECT. I. CHAP. VI.

Of a Phthiſis properly ſo called, or of a Conſumption ariſing by fault of the Lungs.

A Conſumption doth ſo frequently and uſually proceed from the Lungs being depraved, that ſome have termed it the peculiar Diſeaſe of this Bowel: and that it very often ſo comes to paſs, the reaſon is; becauſe (as we have ſhewed before) the pining of the body doth for the moſt part more immediately proceed from the blood depraved and unapt for nouriſhment, it is manifeſt, that as its perfection is acquired in the Lungs, ſo from theſe being ill-affected the ſame is moſt of all vitiated, and degenerates into a languiſhing and corruptible ſtate. For in the Lungs rather than in the Heart or Brain, the threads of life are ſpun, and there they are oftneſt defiled or broken.

A Phthiſis is uſually defined to be A pining away of the whole body, taking its riſe from an Ulcer in the Lungs. But leſs true: becauſe I have opened the dead bodies of many that have died of this diſeaſe, in whom the Lungs were free from any Ulcer, yet they were ſet about with little ſwellings, or ſtones, or ſandy matter throughout the whole: for from thence the blood, becauſe it could neither be freely circulated in the *Præcordium*, nor animated enough by the nitrous air, and when in the mean time it is perpetu-

The definition of a Phthiſis.

perpetually polluted by its proper dregs depoſited in the Lungs, is frequently vitiated and made incapable of nouriſhing thereby : wherefore a *Phthiſis* is better defined, *that it is a withering away of the whole body ariſing from an ill formation of the Lungs.*

The cauſe aſſigned by the Ancients.

The Ancients following *Hippocrates*, for the moſt part have aſſigned only two cauſes of this diſeaſe, *viz.* a *Catarrh*, and *the breaking of a Vein*, to which ſome have added an *Empyema :* and others exclude a Catarrh from this number : for what is vulgarly affirmed, that flegm falling from the Head into the Lungs, and abiding there putrifies, is moſt commonly the cauſe of a Phthiſis, or is often brought by it, we have formerly intimated to be altogether erroneous, and ſhall preſently ſhew it more clearly. In the mean time to ſhew what the matter is that generates a Conſumption as often as it ariſes without an Empyema or Hæmoptoe going before, it muſt be conſidered after how many manners and by what ways any thing diſagreeable or heterogene can enter into the Lungs ; which diligent ſearch being made, it will eaſily appear, that any thing that is an enemy to the Lungs creeps in and is admitted chiefly either by the *Trachea* or by the pneumonic Arteries, yea and ſometimes haply by the Nerves, but nothing by the Veins or Lymphæducts, whoſe function is only to carry back or away the blood or Lympha, and to leave there nothing at all.

What the conſumptive matter is.

By what ways it enters the Lungs.

As to the *Trachea*, it is manifeſt it is ordained for this end, that by its paſſages or pipes the air might be conveyed in or preſently carried back by a conſtant recourſe from whence it comes ; moreover, whether any matter being hurtful or mortal to the *Præcordia* may be admitted the ſame way, ſhall be now our preſent diſquiſition. And that the Lungs frequently incur a pernicious pollution by this entrance is clear from hence, becauſe the moiſt air of ſome regions, repleat with fumes, or abounding with malignant vapours, doth frequently induce the conſumptive inclination ; nevertheleſs the affection thereof is wont to be communicated only by aerial minute particles (whereby either the temperament of the blood or the conformation of the Lungs or both are prejudiced.) But whether beſides this a ſerous matter or ſome humor corrupting the Lungs doth enter them through this paſſage, is not without reaſon doubted : although many do determine a Catarrh or a deſtillation of the Serum from the Brain into the Lungs by the paſſages of the *Trachea*, the principal cauſe of a Phthiſis. Which opinion being erroneouſly delivered by the Ancients, I admire any either of our modern Phyſicians or Philoſophers have admitted thereof ; for it is manifeſt by anatomical obſervations, that nothing from the Brain by the *Glandula pituitaria* (which ſeems the only paſſage from thence) falls down into the Palate or Breaſt, but that the Serum there depoſited is conveyed by appropriate paſſages to the jugular Veins, and is remanded to the blood. Moreover it is manifeſt to ſight, that whatſoever relique of Serum is laid aſide in the Glandules of the Ears, Mouth, Noſe, or Face, is conveyed from them all by peculiar paſſages, inſomuch that no humor whatſoever deſtils from the Brain or the Palate into the Lungs.

Sometimes by the Trachea, yet not deſtilling from the head.

But although matter exciting a Cough doth not deſtil from the Head by the *Trachea* into the Lungs, yet ſometimes falling down from the ſides of the *Trachea* into their cavities, it produces that diſeaſe commonly called a Catarrh. For the *Aſpera Arteria*, like the Arteries bringing blood, are endued with a nervous and muſculous Coat, and ſo do occaſionally enjoy ſenſe and motion, having alſo a glandulous Coat and full of little veſſels to ſuſtain the vital heat and nouriſhment. Theſe laſt Coats make thoſe interſpaces, and as it were cover the Cartilages. Moreover the ſuperfluous ſeroſities proceeding from the blood watering the *Trachea* are depoſited into this glandulous Coat, which for the moſt part preſently ſweating into the cavities of the *Trachea*, ſerves chiefly to make them ſlippery and moiſt : but if the maſs of blood be poured out too much, and precipitated into ſeroſities (as it frequently happens, a cold being taken, or the ſwallowing down of acid things, and on many other occaſions) for this cauſe a great plenty of watry matter ſweats out of the Glandules of the *Trachea* and mouths of the little Arteries into its cavities, which ſoon doth cauſe a moſt troubleſom Cough, and often much ſpittle (which afterwards comes to be conſumptive.)

But ſweating out of the ſides of the Trachea.

The conſumptive matter brought into the Lungs rather by the pneumonic Arteries.

But ſurely this cauſe of Spittle and as it were a Catarrhal Cough very rarely comes alone, becauſe while the blood watering the Trachea having ſuffered ſolution, throws in its ſeroſities into the Glandules (whence preſently they ſweat into its cavities) and alſo the remaining blood being in like ſort diſſolved, it inſinuates its *Serum* ſet apart within the pneumonic arteries, partly into the tracheal hollowneſſes, and partly into the Lympheducts, by the overflowing whereof the Lungs are as it

were overwhelmed and much incited, for the moſt part provok'd to Cough and continual ſpitting. A Cough and ſpitting of this kind as long as moderate, only throwing off the ſeroſities of the blood, rather are beneficial than prejudicial; becauſe the maſs of blood,and the very lungs being throughly purged after this ſort,thoſe ſymptoms for the moſt part ſpontaneouſly abate, and from thence enſues a more perfect health. But if they be protracted a long time,the ſerous humour being on both ſides laid aſide into the tracheal paſſages, and from thence more plentifully daily heapt up, at length it will change into corruption; becauſe as well the free enjoyment of air is impeded, as alſo the motion of the blood, and its temperature wholly perverted; from hence a Cough becomes more fierce, and breathing more difficult; nay rather the whole maſs of blood in as much as it is defiled by the foul blood (which the Veins receive from the Lungs) degenerating by degrees from its benign properties, and being depraved, it not only continually pours forth the ſuperfluous Serum, but alſo the nutritive Juice (which it cannot aſſimilate) out of the pneumonic Arteries into the tracheal paſſages; and ſo this maſs of conſumptive matter is daily increaſed, till the Lungs being more and more obſtructed and filled, and the blood being defiled, and rendred unfit to perform any of its functions, the Cough and Spittle become worſe and worſe, and preſently become dangerous; Moreover breathing being hurt, the faintneſs and pining away of the whole body, the debility of all the functions, and at length a hectick feaver, and a haſty declination to death follows.

A Cough and ſpitting ſometimes healthful.

Yet often being too much is dangerous.

When by the long continuance of a Cough and Spitting, leaſurely encreaſing, the humour is more plentifully depoſited out of the maſs of blood into the lungs, it firſt of all enters into the tracheal little bladders, and at length fills them, and ſomewhat diſtends them, from which while every morning by expectoration then more copiouſly performed, it is almoſt entirely caſt out from them, thence the *Thorax* is exempt for a ſhort ſpace from the burden, and reſpiration ſeems more free: yet a little afterwards the blood being ſtuff'd again with *Serum* or nutritive juice, it pours down new matter into the lungs; and from thence again after meat or ſleep the little bladders are fill'd, and the humours by the afflux daily encreaſed, are more diſtended and enlarged, and at length the ſides of two or more of the little bladders, being burſt, many little bladders are here and there framed as it were into one lake, within which the conſumptive matter being more abundantly collected, there it putrifies (for it is not entirely preſently caſt out) and from thence it corrupts the ſubſtance of the lungs, to which it is joined, and imparts a putrid defilement to the blood paſſing through it. This breach thus made in the lungs is daily encreaſed, and frequently more are at the ſame time formed in divers places, and by reaſon of the great plenty of humours heaped up and putrified in them, a heavineſs of the breaſt is felt, like a weighty burden upon them, the breathing is more hindred; moreover from the tabid blood being more plentifully intermix'd with the maſs of blood, frequent effervеſcences of it, deſtruction of the nutritive juice, alſo thirſt, heat, loſs of appetite, nightly ſweats, and a pining of the whole body do ariſe. But the blood being polluted from the lungs, cauſes them to be puniſhed with a reciprocal affection, that is to ſay from its peculiar pollution; becauſe the blood in the veins receiving this purulent matter in every circuit, it immediately delivers it into the arterial; from whence, whereas it cannot be ſent enough away by ſweat, or by Urine, it is brought back by the pneumonic arteries to the lungs, where again being ſeparated from the blood, it is every where conveyed as well into the little bladders of the Trachea as into the leſſer paſſages; inſomuch, that at length the whole frame of the lungs being filled, clefts or ulcers are formed conſequently in many places, and all the other hollowneſſes are ſtufft with frothy quitter.

Why the Conſumptive matter affects, and by degrees hurts the lungs.

How an Ulcer of the Lungs is made.

But ſometimes it happens that there is one Ulcer or hole, or happily two formed in the Lungs, and the ſides grow callous round about, ſo that the matter being there gathered together is not conveyed into the maſs of blood, but is daily expectorated though in a vaſt plenty. They that are ſo affected,as if they had but an iſſue in the lungs, although they caſt up much Spittle, and thick and yellow matter every morning, and a little ſometimes all day, yet otherwiſe they live well enough in health, they breathe, eat and ſleep well, are well in fleſh, or at leaſt remain in an indifferent habit of body, and frequently arrive to old age: inſomuch that ſome are ſaid to have been conſumptive thirty or forty years, and to have prolonged the diſeaſe even unto the term of their life (for that cauſe not being ſhortened). And in the mean time others who cough or ſpit leſs, within a few months fall into a hectick feaver, and in a ſhort while are hurried into their grave.

An ulcer of the lungs covered with a callus leſs prejudicial.

Hither-

The evident cauſes of a conſumption.

Hitherto touching the conjunct cauſe and formal reaſon of a Phthiſis or pulmonary Conſumption; what belongs to the other cauſes (that is to ſay, procatarctic and evident ones) they truly are various and manifold, inaſmuch namely as they are more near or more remote, inward or outward, and laſtly connatural or adventitious: That I may undertake to deſign the powers, operations, and modes of effecting of all theſe in producing a Phthiſis; primarily it is requiſite that I ſhew, by how many modes, and by reaſon of what occaſions the ſerous humour or (as folks commonly ſay) the Catarrhal, is laid apart out of the maſs of blood into the little bladders of the lungs, and into other paſſages of the Trachea. Upon diligent ſearch of this it is obvious to any one to perceive the morbific cauſe conſiſts of two parts, and that the fault is in the ill temper of the blood ſending an offending matter to the *Thorax*, and alſo the weakneſs or ill tone of the lungs eaſily receiving it.

The primary cauſes of a conſumption ſome from the blood, others in part from the lungs.

The ill temper of the blood diſpoſes to it.

As to the former, it is manifeſt enough by common obſervation, that the maſs of blood being ſtuft with incongruous particles, *viz.* its proper ones degenerated, or with others from other places intermingled, doth boyl up for the expurging of them, and what is to be ſeparated, when it is not eaſily ſent away by any other ways, it is ſpread abroad into the lungs, (if they are of a weaker conſtitution) and cleaves to them.

There are many dyſcracies of the blood, and thoſe of divers kinds and affections, by by which its liquor being diſſolv'd in its conſiſtence, and as it were curdled, doth not rightly contain the ſerous and nutritive juice within it ſelf; moreover ſending away theſe and other excrementitious humours unceſſantly from it ſelf, as ſometimes it depoſits them among other parts, ſo more often into the lungs.

1. The blood ſometimes like Milk grown ſour of it ſelf, is depraved by little and little, and at length departing from its genuine faculty into a ſourneſs, and being diſſolv'd in its exiſtence, doth caſt abroad its ſeroſities (too eaſily prone to ſeparate themſelves) out of the Pneumonic and alſo Tracheal Arteries into the tracheal paſſages. Thus to ſome it is ordinary once or twice in a year, without any manifeſt cauſe to be afflicted with a grievous and troubleſome Cough, with copious ſpitting, which in a certain proceſs of time (after the blood purged from its dregs and excrements recovers its temperature) doth ſpontaneouſly abate, and after doth ſucceed a more firm and durable health. By reaſon of ſuch a Cough ſerving for a purge to the blood, I have known ſome often in a day, and eſpecially every morning, who were wont to ſpit out ſpittle like black Ink, with a ſmall endeavour of the Trachea; which diſtemper when for many months they had conſtantly labour'd under, after a greater Cough occaſionally contracted, with much and yellow ſpittle, they have afterwards eſcaped altogether free from that former black ſpittle; the reaſon whereof is, that a heavier Cough abiding with plentifūl ſpitting for ſeveral days, altogether purges away thoſe melancholy fœculencies from the blood, and moreover it alters the temperament of the blood, or rather takes away the ill temperament thereof.

And ſometimes it receives a conſumptive taint from the nervous juice.

2. The nervous juice being frequently degenerated, and with an abundant lympha returning back out of the fibres and nervous parts into the blood, as it produces ill affects of the bowels, and of the reins (whereof in another place we have hinted) ſo ſometimes it cauſes a fierce and very troubleſome Cough. This kind of Cough one while is Catarrhal, inaſmuch as the Lympha having paſs'd through the maſs of blood, is depoſited in the Lungs by the arteries; another while it is convulſive, inaſmuch as the Nerves and fibres, conſtituted to move the breaſt, are poſſeſt by that liquor, and are provok'd into convulſive motions: from either cauſe either conjunct or ſeparately it comes to paſs, that more grievous paſſions of the brain and nervous kind frequently call on a troubleſom Cough, or are wholly changed into it.

And ſometimes by reaſon of a fault communicated from the Lympheducts.

3. Beſides the faults of the blood and nervous juice, frequently exciting a Cough, it is probable that it ſometimes ariſes from the Lympheducts being obſtructed, which belong unto the Lungs: for whereas very many Veſſels of this kind are ſpread abroad through the Lungs, whoſe function it is to receive whatſoever is ſuperfluous of the Lympha that is carryed through the Arteries into the *Præcordia*, and not immediately brought back by the veins, and to convey it to the trunk of the paſſage of the *Thorax*; if by chance it happens that theſe paſſages are ſtopt or obſtructed by viſcous matter, or compreſs'd or thickned by cold ſhould not well diſcharge their duty, it muſt needs be that thoſe watery excrements ſhut out from their wonted ſluces, or whirling back into the blood, do incite its fierce boyling up, or being poured into the paſſages of the Trachea, do ſtir up a Cough.

4. Neither

4. Neither do the humors above-mentioned only, in as much as they either pervert or hinder the craſis or motion of the blood, induce a Cough (which frequently is the beginning of a Phthiſis;) but moreover any uſual or wonted Evacuations ſuppreſſed, or let, do uſually impreſs a fault upon the Lungs. The menſtruous flux or the Hæmorrhoids obſtructed, often bleeding at the Noſe if by chance it ceaſes, Iſſues cloſed up, Puſtles, Scabs and Wheals driven back, do frequently affix a taint in the *Thorax*. If a plentiful ſpitting from the Glandules of the Mouth ſtops of its own accord, or be cured by Medicine, afterwards ſometimes a conſumptive Cough ſucceeds; wherefore the ſame is vulgarly called a Rheum, which had lately fallen from the Head into the Jaws and Throat, and thence deſtilled deeper into the Lungs; when indeed it is nothing elſe but a certain ſuperfluous ſeroſity of blood, that being uſed to be put aſide by the cephalic Arteries into the Glandules of the Mouth, now being excluded thence, is hurried through the pneumonic Arteries into the Lungs.

The fourth reaſon is uſual evacuations ſuppreſſed.

Beſides theſe private and periodical, or extraordinary Evacuations, whoſe ſuppreſſions incline to a Cough and Phthiſis, there occurs another general and conſtant Evacuation, *viz.* inſenſible tranſpiration; which being either ſtopt or ſuppreſſed, is oftner the occaſion or parent of that evil than all the reſt. For the ſteams that uſually evaporate by the Pores of the skin being reſtrained within, ferment the blood, and ſoon pervert it, and cauſe it to be precipated into ſeroſities; which with other excrements of the maſs of blood being immediately laid aſide in the Lungs, do ſtir up a troubleſom Cough and often a conſumptive one. Hence it is a common obſervation, that the catching of a cold, by which the Pores are ſtopt, whether it be by the blowing of cold air, or being wet by rain, or leaving off cloaths, or by what other means it may come to paſs, diſpoſes very many to diſtempers of the *Thorax*. Wherefore in our Idiom the cauſe being put for the effect, a Cough is called *Catching of cold.*

By reaſon of tranſpiration hindred.

Theſe are the chief cauſes and occaſions which occur from the blood any ways depraved, and therefore depoſiting a peccant matter into the Lungs. There follow other cauſes in regard of the Lung it ſelf, *viz.* thoſe which diſpoſe this Bowel more readily to a Cough or a Phthiſis, of which there are three ſorts. 1. An ill frame of the Breaſt. 2. An innate weakneſs of the Lungs, or hereditary diſpoſition to a Conſumption. 3. Preceding diſeaſes of the *Thorax*, as a Wound, a Blow, a Pleuriſie, a Peripneumony, Empyema, Spitting of blood, the ſmall Pox and Meaſles, *&c.* 4. The incongruity of air which is inſpired (as deſerving a place among the procatarctic cauſes.) By reaſon of any one of theſe cauſes, and ſometimes of many together, the matter provoking a Cough, proving often after conſumptive, doth eaſily aſſault the Lungs, and enters them, and frequently imprints a deadly hurt. On each of theſe we ſhall inſiſt a little.

Partly from the Lungs.
From the breaſt ill formed.
From the hereditary diſpoſition.
From foregoing diſtempers of the breaſt.
From incongruity of the air.

Firſt therefore as to the frame of the Breaſt the caſe ſtands thus: *viz.* that the Lungs being ſtill whole and ſound, and free from any phthiſical impreſſion, may be kept for a long time in their office, it will behove that they ſtill be exerciſed with a motion that is vigorous, and with ſtretched out ſails as it were to diſcharge the ſtrong interchanges of the Syſtole and Diaſtole; to that end, that the air being plentifully ſuckt in, may be admitted to their inmoſt apartments, and from thence immediately be caſt back for the moſt part together with all the effluvia and ſooty vapours at every change of breath. Wherefore ſince the action of the Lungs doth depend much on the frame of the *Thorax*, as being the moving Engine, it muſt needs be, that by reaſon of its ill faſhioning, the function of breathing becomes defective in many things. There are two ſpecial kinds of a Breaſt ill framed, (*viz.* crookedneſs, and ſhoulders like wings) for which reaſon many are found prone to a Phthiſis: the reaſon of which is, that in any ſuch figure of the breaſt, being either depreſſed or made long, the Lungs do neither injoy a ſpace ſo free and ample, nor can the moving Muſcles be ſo ſtrongly contracted as in a ſquare breaſt.

The reaſon of the former expoſed.

2. The innate debility or hereditary diſpoſition of the Lungs to a Conſumption is ſo frequent and vulgarly known, that when any is found inclining to a Conſumption, he is preſently queſtioned, whether his parents were not obnoxious to this diſtemper? Very many of theſe being endued with a narrow breaſt and a neck ſomewhat long, and of a conſtitution very tender, contract a Cough from the leaſt occaſion; neither can they endure a cold or moiſt air. To ſome of theſe a manſion in a City is very prejudicial, where the air is breathed in thick and ſmoaky; on the contrary, to others prone unto the ſame diſpoſition it is very friendly (the reaſon whereof we ſhall diligently inquire hereafter) To all of them a North-wind is for the moſt part an enemy, conſidering that it uſually irritates a Cough, alſo a Spitting of blood, a Pleuriſie, or Peripneumony,

What an hereditary diſpoſition is.

mony, *viz.* the pneumonic or the thoracical Veſſels being thereby ſtufft, and in the mean time the blood being rendred more turgid and ſharp, by reaſon of tranſpiration hindred, and the effluvia's reſtrained within the maſs thereof.

In what it conſiſts.

For an hereditary diſpoſition to a Phthiſis doth chiefly conſiſt in theſe two things: *viz.* 1. In regard the Patients being endued with a more ſharp and elaſtic blood, do require a more plentiful tranſpiration; which perhaps if it be leſs granted, the matter that was wont to evaporate redounds upon the infirm Lungs. 2. If the pneumonic Veſſels be too looſe and tender, they do not duly contain the Serum and other recrements of blood within the diſſolved maſs thereof, but they ſometimes ſuffer both them and a certain portion of the blood it ſelf to break out into the Tracheal paſſages: whoſe moving Fibres, when they are infirm, do not preſently turn forth what is poured out into the cavities; but they ſuffer it to abide and putrifie in the ſame place, and at length to degenerate into black filthy gore corruptive both of the Lungs and blood.

What the conſumptive diſeaſes of the breaſt are.

3. A Phthiſis is ſometimes the product or conſequent of ſome other previous diſtempers of the Breaſt. Thoſe conſumptive paſſions chiefly are Empyema's, Pleuriſies, a Peripneumony, and Impoſthume of the Lungs; and ſometimes the ſmall Pox, Meaſles: alſo irregular Feavers ill or ſlightly judged, do cauſe the ſame effect. The chief of theſe diſtempers, or at leaſt thoſe which are proper to the *Thorax*, together with the rendring the reaſon of the cauſes, and how they diſpoſe to a Conſumption, ſhall be declared hereafter, with the reaſons and manner of procedure; in the mean time we are to take notice, that this kind of fault is common to them all, that is to ſay, they diſſolve the unity and weaken the tone of the Lungs, and pervert the temperature of the blood; whence whatſoever incongruous or diſtempered thing is poured out upon them from its depraved maſs, they do eaſily admit thereof, and difficultly or not at all drive it back.

The influence of the air for exciting a Conſumption.

4. The procatarctic cauſes of a Phthiſis being now explained, *viz.* thoſe which conſiſt as well from the blood as the Lungs, there is another common to them both, which may be juſtly added, and (although altogether extrinſec) hath great affinity with them both, *viz.* the condition or temper of the air breathed in. For ſuch is the influence hereof to ſome conſumptive perſons, that the cauſe of the diſeaſe is ſometimes wholly aſcribed to the incongruity of the air wherein they dwell, and for a cure the alteration of air or ſoil is preferred to all other remedies whatſover. Hence many of our Country troubled with a Cough, or being in a Conſumption, flock to the Southern parts of *France*; and others in the mean time who cannot go beyond Sea, or will not, preſently haſten to remove out of the City-ſmoke into the Country as to a moſt undoubted refuge: wherefore all our Villages near *London*, which injoy a clear and open air, are eſteemed as ſo many Spittles for conſumptive perſons. Notwithſtanding all do not alike receive help from ſuch a change of places; for many either paſſing to *France* or to Country Villages, do in thoſe places rather find their graves than health. And therefore *London* is not preſently to be forſaken by all phthiſical perſons: for I have known many obnoxious to a Cough or Conſumption to have enjoyed their health much better in this ſmoaky air than in the Country. So that for cure of the ſame diſeaſe, while ſome avoid this City as Hell, others flye to it as to an *Aſylum*.

The groſſer and City-air to ſome conſumptive perſons healthful, to others hurtful.

The reaſon whereof is inquired.

The reaſons of theſe things do clearly appear out of the Doctrine of Breathing before handled; for we do demonſtrate the blood paſſing through the Lungs, both as to its kindling or vitality, and as to its motion doth chiefly depend on nitrous air ſuckt in; whence it is a conſequence, that the tenor of this ought to be ſo proportioned to the temperament of that, that the blood being moderately kindled within the *Præcordia*, may burn out clearly and vigorouſly, as well without ſmoak and ſootineſs as without too intenſe a flame, and that it may paſs the pneumonic Veſſels freely, and without any hindrance or leaving of recrements. Wherefore a moiſt, fenny, and cloſe air, as it is healthful to none, ſo to them that cough it is eſpecially hurtful; on the contrary, a ſerene and mild air, moderately injoying the Sun and wind, as it is healthful to all perſons, ſo it is friendly to all conſumptive perſons. As to other conditions of the air, ſome eſcape a Cough, or loſe it living in mountainous places expoſed to the Sun, where the impendent Atmoſphere being free from all thick, ſmoaky, and feculent vapours whatſoever, abounds with nitrous particles: for thoſe whoſe thick and feculent blood abounds with an impure Sulphur, to kindle this duly and to waſte the dregginеſs, there is need of a very thin and nitrous air. If the Lungs be not too tender, but firm and ſtrong, they endure the more fierce aſſaults of its particles; on the other ſide, they who have a thin and ſubtil blood, eaſily diſſolvable and endued with a more

pure

pure but very little Sulphur, and having tender and ſoft lungs, very ſenſible, and of a finer texture; theſe perſons being impatient of a nitrous and ſharper air, are moſt at eaſe and beſt in a thick and more ſulphureous one. Wherefore it conduces to theſe perſons, that they breathe the groſs and more fat air of a ſmoaky City; which to an impoveriſhed and more thin blood, doth afford Sulphur (which fails ſometimes) and alſo Nitre, and doth ſomething thicken and fix its ſubtile conſiſtence; moreover it dulls the ſubſtance or texture of a Lung too much ſenſible and more thin, and is a defence againſt the invaſions of a more ſharp and improportionate Air. It is manifeſt by frequent experience, that a thicker Air, provided it be ſulphureous, proves very benign to ſome phthiſical perſons (that I do not ſay to all.) It is a common obſervation, that a Conſumption ſeldom infeſts thoſe Regions either in *England* or *Holland*, where fires are nouriſhed by turff, and do breathe a very ſulphureous odour, yea rather thoſe places are chiefly wholeſom and frequently ſanative to perſons obnoxious to a Phthiſis, or labouring under it. To which we may add, that a ſuffumigation of Sulphur and Arſenic (which is filled with much Sulphur) is reputed for the curing of almoſt incurable Ulcers of the Lungs, although the laſt, yet the moſt efficacious remedy. Moreover add to this, that pectoral Medicines prepared of Sulphur are far to be preferred to any other; ſo that Sulphur is juſtly reported by Chymiſts to be the Balſam of the Lungs. By what order and by what means theſe Medicines do work, and ſo notably help in diſeaſes of the *Thorax*, we ſhall hereafter make diligent ſearch into: in the mean time that ſulphureous Air is found helpful to certain phthiſical perſons, the reaſon conſiſts in theſe two things; *viz.* in the firſt place, as we now intimated, from ſuch an Air ſuckt in there is help brought to the jejune and depauperated blood and to the tender Lungs. Secondly, that the ſulphureous Particles being ſuckt in with the nitrous, do provide againſt, or take away the acidities of any of the humours (by which their flowings and extravaſations into the Lungs do chiefly ariſe.) And for this reaſon it is that ſulphureous Medicines, being alſo taken inwardly, do confer ſo excellent a help to them that cough or are phthiſical: and therefore Sulphur, as I now hinted, hath the report of being the Balſam of the Lungs. For as balſamic things applied to an Ulcer or Wound extinguiſh the acidity of the Ichor there ſweating out and corrupting and paining the little Fibres, ſoon eaſe the pain, and afterwards heal the wound; ſo alſo the ſulphureous Particles, paſſed into the Lungs either with the air or with the blood, in as much as they provide againſt or aboliſh the acidities of all humors, *i. e.* the blood, the Serum, the Lympha, the nervous or nutritive Juice, they conduce to the prevention or cure of a Conſumption. We ſhall in what follows more at large declare the cauſe, when ſulphureous Medicines ſhall be particularly treated of.

A ſulphureous air healthful to ſome conſumptives.

Sulphureous Medicines chiefly agreeing.

The reaſon thereof diſcourſed.

The conjunct and procatarctic cauſes of a Phthiſis being thus handled, it will not be neceſſary to diſcourſe much touching the evident cauſes. For in what manner a cloſing of the Pores by cold, a ſurfeit or tipling, and other errours of ſeveral ſorts, in the ſix non-naturals, diſpoſe to thoſe diſtempers, and ſometimes preſently do bring them, is ſo clear, that it needs no explaining. Neither is there any reaſon we ſhould be long delayed about the Semiotical part of this diſeaſe; nevertheleſs it is fit we obſerve the divers ſtates or diſtinctive ſigns which certainly belong unto it. 1. When it is meerly a Cough. 2. When it begins to degenerate into a Phthiſis. 3. When it is a perfect and almoſt deſperate Phthiſis. From which things duly deſigned, the Prognoſtic of the above-mentioned affections will be very apparent.

The three times or diſtinct ſtates of a Cough.

1. And in the firſt place what belongs to a new Cough, and as yet alone, this taking its riſe from any cauſe whatſoever in bodies prediſpoſed to a Phthiſis, will ſcarce ever be free from the ſuſpicion of danger; but in a ſtrong man, and one who hath often before endured a Cough Scot-free, it will not be immediately to be feared: for when being ſtirred up from a more forcible evident cauſe, without Feaver or indiſpoſition of the whole body, it ſhall not be very troubleſom, then it meerly paſſes for a cold being taken, and is altogether neglected, or in a ſhort time is wont to be finiſhed without many or very conſiderable Remedies. Moreover if a ſmall Feaver with thirſt and want of appetite accompany this, there is hope that the blood being reſtored to its due temperament, the Cough then will ceaſe of its own accord: but if it be protracted longer, and not eaſily yield to vulgar Remedies, and produces much ſpitting, and that diſcoloured, it muſt not be any longer neglected, but be provided againſt by a method of healing, and by fit remedies and an exact courſe of diet. For then it may well be ſuſpected, that the Lungs being prejudiced in their ſtructure, do not circulate the blood entirely, but let fall the Serum and Lympha, and frequently

when new, there is no ſuſpicion of a Conſumption.

frequently the nutritive Juice; and moreover thoſe humors ſo laid aſide do putrifie; and from thence the blood is defiled, which by a reciprocal hurt prejudices again the Lungs.

When it begins to induce a Conſumption.

2. But if to a Cough growing daily worſe and worſe with plentiful and thick ſpittle, a languiſhing and pining of the whole body, loſs of appetite, difficult breathing, thirſt, and fervent heat of the blood be added, there is great cauſe of ſuſpicion that it is come at leaſt to the firſt limits of a Phthiſis (if not further.) Wherefore it will behove us to uſe all means, whereby the Lungs may be freed from the great quantity of matter heaped up together, and be defended from its continual aſſault or invaſion; and alſo that the maſs of blood may be cleanſed from all dregs, and reſtored to its due temperament whereby it may rightly contain its ſeroſities and other humors within it ſelf, or transfer them to ſome other place than to the Lungs.

When it becomes a confirmed Conſumption.

3. But if, beyond the ſtate of this diſtemper now deſcribed, plenty of ſpittle, and that diſcoloured, ſhall be daily increaſed, and all other things growing worſe and worſe, a dejection of the whole ſtrength, and a hectic Feaver with a continual thirſt, night Sweats, an Hippocratical face, an utter decay of the fleſh almoſt to the drineſs of a Skeleton, happen upon all theſe, then for the moſt part no place is left for Medicine, but only a dreadful prognoſtic; at leaſt all hope of Cure being waved, we muſt inſiſt upon Anodynes, whereby an eaſie death may be procured.

The curing method, and firſt againſt a beginning Cough.

What therefore belongs to the cure of a Cough in general, according to the three above-mentioned ſtates of this diſeaſe, a threefold method of healing ought to be appointed, *viz.* that bounds as it were being ſet, we may more diſtinctly preſcribe what is to be done for the cure of a Cough, whilſt being on this ſide the limits of a Phthiſis, it paſſes only for a cold catched. 2. What manner of healing to a beginning Phthiſis. 3. What to a Phthiſis conſummated, or deſperate.

1. Although againſt a new Cough for the moſt part there are uſed only Remedies Empirical, and ſcarce any of the common people but are furniſhed with many and divers of this ſort, which every where without the advice of a Phyſician very many confidently take, and without method, and give them to others: yet men of a delicate conſtitution, or inclining to a Conſumption hereditarily, or ſometimes formerly in hazard from a Cough, ought immediately to provide againſt the firſt aſſaults thereof, and readily betake themſelves to the Precepts of Phyſick; according to which, that the method of healing may be duly inſtituted, the curatory indications ſhall be chiefly theſe three; *viz.* 1. To appeaſe or take off the diſorder of the blood, from whence the fluxes of the Serum do proceed. 2. To derive the excrements of the blood and all *exuviæ*, apt to ſeparate from it, from the Lungs to the Pores of the skin, or to the urinary paſſages, and into the other Emunctories. 3. To ſtrengthen the Lungs themſelves againſt the reception of the Serum and other humors, and alſo to defend them againſt the invaſion of outward cold, whereby they are wont to receive further hurt. Upon each of theſe we ſhall treat a little more plainly.

Three indications.

The firſt reſpects the effervеſcence of the blood.

1. The firſt indication reſpects as well the boiling up of the blood, wherein by reaſon of the effluvia's reſtrained, it grows too fervently hot, and boils in the veſſels; as its diſſolution, whereby being ſolved in its conſiſtence, it lets go too much Serum and other humors from its embraces. For the taking away of both, a thin diet muſt be appointed, and, the injury from outward cold carefully declined, a little more ſweating ought to be procured, or at leaſt the accuſtomed reſtored. To this end let the Patient put on thick garments, and let him keep his bed or chamber, at leaſt let him hardly go out of his houſe, evening and morning let a ſmall breathing Sweat be provoked by Poſſet-drink boiled with Roſemary or Sage. If notwithſtanding all this the Cough increaſes, Phlebotomy, if the ſtrength and conſtitution will bear it, is often uſed with ſucceſs: after which Hypnoticks for the moſt part help, in as much as they retard the motion of the heart and conſequently the too precipitate courſe of blood: moreover they cauſe it to circulate in the pneumonic Veſſels gently and mildly without any great throwing out its ſeroſities, and to ſend away what is ſuperfluous either by Sweat or Urine. To this purpoſe pectoral Decoctions are alſo to be adminiſtred, in as much as they deſtroy the acidity of humors, and hinder the diſſolution of the blood, and its melting into ſeroſities. By the like reaſon and manner, Medicines prepared of Sulphur do ſo ſignally help againſt a Cough.

The ſecond reſpects the derivation of the Serum and other excrements from the Lungs.

The ſecond indication, *viz.* that the Serum and other recrements of the blood, derived from the Lungs, may be evacuated by other ways, is performed by Diaphoretics, Diuretics, and mild Purgers; which ought to be mixed with other Remedies,

or

or now and then uſed alone. Wherefore after Phlebotomy we uſe to preſcribe a gentle Purge, and ſometimes to repeat it. Among the Ingredients of the pectoral Decoction let the Root of Chervile, Butchers-broom, Elicampane, and other things that provoke Sweat and Urine be put. Hog-lice, volatile Salt of Amber, and other fixed Salts and Powders of Shells made into Pills with Turpentine are often given with ſucceſs.

The third intends the ſuppreſſing the Catarrh and ſtrengthing the Lungs.

The third indication, that the Lungs and their paſſages might be defended againſt the flowing of humors, the encountring of cold, and the ſuppreſſion of the Catarrh, as they commonly call it, is performed by Linctus's, Lohochs, and other private Remedies, and chiefly reſpects two things; *viz.* that the mouths of the Veſſels and Glandules opening into the *Trachea* be ſhut with moderate Aſtringents, leſt they ſhould too much caſt out the ſeroſities into it: and ſecondly, that the ſides of the Tracheal paſſages may be made ſmooth and glib, that neither from the pouring out of the ſharp Serum, nor invaſion of any outward cold they may be offended, and continally provoked into a troubleſome Cough; and moreover when thoſe paſſages are made ſlippery enough, the ſpittle ſometimes obſtinately cleaving to their ſides, might be the more eaſily coughed out. For the firſt intention it is, that Conſerve of red Roſes, Olibanum, Maſtich, Lohoch of Pine-tree, Syrup of Jujubes, of dried Roſes, of Cup-moſs, and other Aſtringents are often put into the forms of Pectoral Preſcriptions. For the ſecond intention Liquoriſh, with the divers preparations thereof, is reputed a famous Remedy againſt any Cough: for this purpoſe Syrups and Lohochs, and all other ſweet Pectorals ſeem to be ordained. To which is added Oyl of ſweet Almonds, either adminiſtred by it ſelf, or brought with pectoral Syrups after a long ſtirring of them together into a milk-form liquor.

Theſe are the chief Therapeutic indications, together with the apt intentions of healing, which ſeem chiefly to be of uſe for a new Cough, while as yet we have no ſuſpicion of a Phthiſis, or at leaſt that it ſubſiſts without the manifeſt limits thereof; it now remains, after this general method briefly ſhadowed out, that we ſubjoin certain choice forms of Medicines appropriated to every intention. Theſe, though they are manifold and of divers preparations, yet thoſe which are of chiefeſt note and moſt in uſe, are Mixtures, Linctus's, Lohochs, Tinctures, Balſams, Troches, Lozenges, Powders, Pills, Decoctions, and diſtilled Waters. Of each of theſe we ſhall ſet down ſome choice Receipts.

Forms of Medicines which are moſt in uſe.

1. Mixtures.

Take of Syrup de Meconio, of Jujubes, of each an ounce and half; of powder of Olibanum a dram, the water of Earth-worms, or of aq. Hyſterica, or Peony compound a dram, mingle them. The Doſe is one ſpoonful at bed-time and after midnight.

Take of the water of Snails, of Earth-worms, of each an ounce and half; of the liquid Laudanum Tartarizated two drams, Syrup of Violets an ounce. The Doſe is one ſpoonful at bed-time.

Take of Snail-water ℥vj. Syrup of the juice of ground-Ivy, ℥iij. Flower of Brimſtone ℥ß. mix them. The doſe is one ſpoonfull at bed-time, and ſoon in the morning.

Take of our ſyrup of Sulphur 4 ounces, Water of Earth-worms 1 ounce. Doſe 1 ſpoonfull after the ſame manner.

2. Linctus's.

Take of ſyrup of Jujubes, Maiden-hair of each one ℥ and half, ſyrup of red Poppys 1 ounce, mix them, to be lick'd with a Liquoriſh Stick.

Take Oyl of Sweet-Almonds freſh drawn, Syrup of Maidenhair, of each 1 ounce and half, white Sugar-candy 2 drachms, mix them by beating in a Glaſs-morter, or ſhaking them in a Glaſs Vial till it wax white.

3. Lohochs.

Take Conſerve of red Roſes 2 ounces and half, Lohoch Sanum 1 ounce and half, Spec. Diatragacanth. frig. 1 dram and half, flowers of Brimſtone half a dram, Syrup of Violets or red Poppyes as much as ſufficeth, let it be made a ſoft Lohoch. Doſe 1 dram and half at night and early in the morning; at other times to be licked with a Liquoriſh ſtick.

Take of the powder of the leaves of Hedge-muſtard, or Rockets, 1 ounce and half, clariſied Honey 4 ounces, mix them for a Lohoch, let it be adminiſtred after the ſame manner. It agrees with cold Conſtitutions.

4. Tinctures,

4. Tinctures.

Take of Tincture of Sulphur, without empyreuma 3 drams, Dose from 6 drops to ten in the evening, and early in the morning in 1 spoonfull of Syr. of Violets, or of the juice of ground-Ivy; I scarce know a more excellent remedy for any Cough, provided there be no feaver.

Take of Tincture of the Sulphur of Antimony 2 drams, Dose 20 drops evening and morning in one spoonful of the pectoral Syrup.

Take of the Tincture of Gum Ammoniack (prepar'd with the Tincture of Salt of Tartar) 1 ounce, Dose from 15 drops to 20. After the same manner the Tinctures of Galbanum, Assa fœtida, Gum of Ivie (prepar'd after the same manner) are proper for a Cough in any cold constitution.

5. Balsams.

Take of Opobalsamum 2 drams, Dose from 6 drops to ten in a spoonfull or two of Hyssop, or Penny-royal, or any other Pectoral water.

Take of the Balsam artificially distill'd, commonly call'd the Mater Balsami, *two drams, Dose from 6 drops to ten in one spoonfull of Syrup of Violets or Canary Wine evening and morning.*

Take Balsam of Sulphur two drams, the dose from five drops to ten after the same manner.

Take of Balsam of Peru *one dram, Dose from two drops to 4 or 6 in Conserve of Violets.*

6. Troches.

Take of the Species of Diatragacanth. frigid. ℈ß. Liquorish ʒj. flower of Sulphur ℈ij. flower of Benzoin ℈j. Sugar Penids ʒiij. make a Paste with the dissolution of Gum Tragacanth in Hyssop-water, form it into troches of the weight of ʒß. Take one often in the day or in the night.

Take of the seeds of white Poppies ʒvj. of the powder of the flowers of red Poppies ʒj. extract of Liquorish *ʒij. milk of Sulphur ʒß. Sugar Penids ℈ij. with mucilage of Quince-seeds make a Paste, and form it into troches.*

Take of the Species Diaireos, *of the lung of a Fox, of each ʒß. Sugar Penids ℈ij. with the dissolution of Gum Tragacanth, make them into Troches.*

Take of powder of Elicampane, Anniseeds, Liquorish, *of each ʒij. flower of Brimstone ʒj. of Tablet Sugar ℈iß. juice of* Liquorish *dissolv'd, as much as will suffice, make Troches.*

7. Lozenges.

Take of the Species Diatragacanth. frigid. ʒiij. powder of the flowers of red Poppies, milk of Sulphur, of each ʒß. of Sugar dissolv'd in Poppy-water, and boyl'd to make Tablets, ℈iiij. form lozenges of ʒß. weight.

Take of Species Diaireos, *of the lung of a Fox, of each ʒiij. flower of Brimstone, powder of Elicampane of each ʒß. of the whitest Benzoin ʒj. make them in a fine powder, adding of Oyl of Anniseeds ℈j. Sugar dissolved, and boyled to a height to make lozenges ℈viij. for lozenges of ʒß. weight.*

8. Powders.

These though more seldom, yet are sometimes given with success in a Cough, and pneumonic distempers.

Take of the tops of Ground-Ivy somewhat reddish, a sufficient quantity, bruised let them be form'd into a Cake, which dryed presently in the hot Sun, reduce into fine powder, and keep it in a glass. This Plant keeps its virtue with smell and taste longer than any either Conserves or Syrups, and greatly profits in a grievous and pertinacious cough. Take from ʒß. to a dram, in distill'd water, or pectoral decoction twice in a day.

After

After the same manner Powders of other pectoral Plants are prepared, and taken with benefit.

Take of Cup-moss or chin-cups ℥iij. *milk of Sulphur* ℥ j. *Sugar-candy* ℥ß. *make a powder; the dose from* ℈ j. *to* ℥ſs. *twice in a day. This powder is given with great benefit to those labouring with a chin-cough.*

Take of the flour of Brimstone, Olibanum, *Ceruse of Antimony, of each* ℥ ij. *divide it into* xii. *parts, take one part in the morning, and another in the evening in a spoonfull of a convenient vehicle.*

9. Pills.

Take of Aloes rosata, *or rather of* Ruffus's *his Pill, flower of Brimstone of each one dram and half, flowers of Benzoin* ℈ j. *Juice of* Liquorish *dissolv'd in as much Snail-water as will suffice to make a mass, form it into small pills to be taken* 4. *at night, to be repeated every or every other night.*

Take of powder of Elecampane, Liquorish, *flower of Brimstone, of each one dram, flowers of Benzoin half a dram,* Tarr *as much as is sufficient, form it into small pills, the Dose* 3 *or* 4, *evening or soon in the morning.*

Take of Millepedes or Hogs-lice prepared ℥ ij. *the powder of the seeds of Nettles, Burdock of each half a dram, Oyl of Nutmegs distilled* ℈ j. *Salt of Amber half a dram, Juice of* Liquorish *what will suffice, form it into small Pills, take three in the morning and in the evening.*

10. *Decoctions.*

These are taken either by themselves, or with the addition of Milk. Among those which are of the first kind, 1. The Pectoral Decoction according to the *London Dispensatory*, offers it self. Which is taken twice a day from ℨ iiij. to vj. or ℨ viij.

Take of the leaves of Ground-Ivy, white Maiden-hair, Harts-tongue, Coltsfoot, *Agrimony, of each one handfull, Roots of* Chervil, *Knee-holm, of each one ounce,* Carthamus *and sweet Fennel seeds, of each half an ounce, boyl them in* 6 *pints of Spring-water to the consumption of half, adding towards the end* Liquorish *three drams, Raisins stoned two ounces, Jujubes,* n° vi. *or clarified Honey three ounces, make an Apozeme, clarifying it with the white of an Egge; Dose* 6 *ounces warm,* 2 *or* 3 *times in a day.*

Decoctions taken with Milk, are used morning and evening instead of Breakfast and Supper, according to the manner following.

Take the flowers of greater Daisies one handfull, three cleansed Snails, half an ounce of candied Eringo roots, Barly 3 *drams, boyl them in a pint and half of water to a pint. Take* 6 *or* 8 *ounces warm, adding a little milk; and afterwards the quantity encreased by little and little.*

After the same manner, Cup-moss, Ground-Ivy, St. *John*'s-wort, and other pectoral herbs are boyl'd and taken with Milk.

The Decoction of Woods often does conduce much to the cure of a stubborn Cough, especially if appointed in the place of Beer, for ordinary drink, and taken for some time.

Take of the roots of Sarsaparilla 4 *ounces, China two ounces, white and red Sanders of each half an ounce, shavings of Ivory and Harts-horn of each* 3 *drams, let them be infused, and boyled from* 8 *pints of* Conduit-water *to* 4, *adding* Liquorish 6 *drams, Raisins stoned an ounce and half; in a phlegmatick or colder constitution, adde of shavings of* Lignum vitæ.

11. *Distilled Waters.*

Every one may compound manifold and divers forms of these as occasion requires, and appoint according to the constitution of the patient, sometimes simple Milk, sometimes Milk with some part of Wine, sometimes Ale, or *Brunswick* Mum. For a Sample we will prescribe the form of these.

Take

Take of the leaves of ground-Ivy, Hyſſop, Penny-royal, of each four handfulls, of Snails half-boyl'd in their ſhells two pounds, Nutmegs ſliced no. vj. *Upon all being cut ſmall pour eight pints of freſh milk, let it be diſtilled in the common Organs,* i. e. *a Pewter-Still.*

The doſe 3 *ounces twice or thrice in a day by it ſelf or with ſome other Medicine.*

Every doſe let it be ſweetned when it is taken with Sugar-candy, or with the ſyrup of the juice of Ground-Ivy.

In a conſtitution leſs hot, eſpecially if there be no fervent heat of the blood or *Præcordium*, to ſix or ſeven pints of Milk, adde one pint or two of Canary wine; and in a phlegmatick or old body, inſtead of Milk let the *Menſtruum* be Ale or *Brunſwick* Beer, *i. e.* Mum.

Moreover, in Winter-ſeaſon when Snails cannot eaſily or ſcarcely be procured at all, there may be ſubſtituted in their ſtead Lambs or Sheeps Lungs, alſo ſometimes Calves, being half-boyl'd and cut ſmall, with the forementioned ingredients, and a fit *Menſtruum* being added, let them be diſtilled in common Organs, or Roſe-ſtills.

The convulſive Cough of children call'd the Chin-cough.

To this form, treating of a Cough not yet arrived to a Phthiſis, ought to be referred the convulſive or ſuffocating Cough of children, and in our Idiome called the *Chin-cough*. This aſſaults chiefly Children and Infants; and at certain ſeaſons, *viz.* Spring and Autumn eſpecially, is wont to be epidemical. The diſeaſed are taken with frequent and very fierce fits of Coughing, wherein namely the Organs of breathing do not only labour in pain, but alſo being affected convulſively, they do variouſly ſuſpend or interrupt their actions; but for the moſt part the Diaphragma convulſed by it ſelf, or by the impulſe of other parts, doth ſo very long obſtinately continue the Syſtole, or Diaſtole, that Inſpiration, or Expiration being ſuppreſs'd for a ſpace, the vital breath can ſcarcely be drawn; inſomuch that coughing as being almoſt ſtrangled they hoop, and by reaſon of the blood ſtagnating, they contract a blackneſs in their countenance; if perhaps, thoſe organs not in ſuch a meaſure convulſed, they are able to breathe any thing freer, notwithſtanding they are forced always to cough more vehemently and longer, untill they wax faint.

The reaſon thereof.

The formal reaſon or conjunct cauſe of this diſeaſe, conſiſts in theſe two things, *viz.* that there is preſent a quick and vehement irritation of the lungs, whereby they are almoſt continually incited to throw off ſomething troubleſom by Cough; and alſo that the motive parts of the *Thorax*, *viz.* the Nerves and nervous fibres being prediſpoſed to convulſions, as often as they are irritated, do excite a Cough not regular but convulſive, and ſuch as is oppoſite or injurious to the uſual function of breathing.

The cauſe partly a Catarrh.

The matter provoking the lungs ſo frequently into a Cough ſeems to be the *Serum*, unceſſantly ſoaking out of the maſs of blood, by reaſon of its frame being too much looſened, and troubling the parts belonging to the breaſt, inaſmuch as it deſtills as well through the tracheal arteries into the hollowneſs of *aſpera arteria*, as that it is poured in plentifully through the pneumonic arteries into all the open paſſages.

A convulſive diſpoſition of the parts of the breaſt.

The convulſive diſpoſition of the moving parts, as in other convulſive diſtempers, ſeems to proceed from a heterogene and elaſtic matter falling from the brain through the nervous paſſages, together with the nervous liquor, into the ſmall moving fibres of the breaſt; wherefore, when the ſpirits that are contained in thoſe little fibres, are ſtirr'd to perform violent motions of breathing out, they paſs into convulſive motions.

The prognoſtick of this diſeaſe.

What relates to the Prognoſtick of this diſtemper, this Cough although it be ſeldom very dangerous or mortal, yet it remains very difficult of cure; and frequently it rather ceaſes by change of the ſeaſon than is extinguiſhed by remedies. The cauſe whereof is, that here not, as in an uſual Cough, the blood onely ought to be altered, and its recrements to be derived out of the Lungs, to be conveyed to the habit of the body by ſweating, but moreover an amendment of the nervous juice ought to be procured.

Cures firſt Empirical.

About the curing of this diſeaſe, the way of healing uſed in other kinds of Coughs doth rarely profit here; wherefore old women and Empiricks are oftener conſulted than Phyſitians, and the rational curatory method being poſtponed and neglected, remedies for the moſt part onely Empirical are brought into uſe.

Among the many remedies of this kind, theſe two following are preferr'd to all others, and chiefly wont to be uſed; *viz.* Cup-moſs or Chin-moſs or Chin-cups, and the various preparations thereof and compoſitions are taken inwardly, and if there

ſhall

ſhall be need of any further medicine, that ſome Bugbear being preſented, the Child labouring with it may be caſt into a ſudden fright. But if the wiſhed ſucceſs be wanting to adminiſtrations of this ſort, Ptiſans, Syrups, Julips, or Decoctions, and other pectoral helps are rejected, and frequently they deſiſt from all other Medicines, expecting untill the diſeaſe either at length of its own accord determine, or be cured by reaſon of the ſucceeding change of the year.

1. Chin-cups or Moſs is in moſt common uſe in our Countrey againſt the Coughs of Children, and is vulgarly enough known as to its form and manner of growing. It is of an aſtringent nature (as far as we gather by its taſte) and contains in it ſelf particles ſomewhat ſharp and biting, and ſmelling of plenty of volatile Salt: from whence we may ſafely conjecture that its uſe is to fix the blood, and to appeaſe the fluxes of *Serum*, and moreover by volatiliſing the nervous juice, to take away the convulſive diſpoſition. It is uſually adminiſtred in form of Powder, Decoction, and Syrup, according to the following Receipts.

Chin-cups a great remedy.

The reaſon wherof is inquired.

Take of Chin-cups in powder one dram, Sugar-Candy one ſcruple, mix them, divide it into three or four parts, take a doſe morning and evening with a fit vehicle.

Take of the ſame Cup-moſs two drams, milk of Brimſtone two ſcruples, powder of Anniſeeds one ſcruple, divide it into ſix parts to be taken as the former.

Take of the ſame Chin-moſs or cup-moſs one dram boyled in milk for one doſe; take it morning and evening. To thoſe with whom milk doth not agree, or to whom it little profits, let it be boyled in Spring-water or Hyſſop-water, or in any other pectoral water, and let it be given from two ounces to four, twice in a day, ſweetning it with Sugar or ſome fit Syrup.

Take of this Muſcus Pyxidatus or chin-moſs one ounce, boyl it in two pints of ſome pectoral water to the conſumption of half: To it ſtrained adde of Sugar-Candy one pound, and evaporate it in a gentle bath, to the conſiſtence of a ſyrup.

2. The other remedy for the convulſive Cough is wont to be, that they be caſt into ſome ſudden fright; from hence, whenas medicines effect leſs, with the vulgar it is a familiar practice, that, to fright them, while a great Mill is driven about with a ſcreeking noiſe, and a dreadful aſpect of the wheels, the diſtempered be put into the Trough or Receiver of the Grain or Corn, and from thence the ſudden cure of this diſeaſe ſometimes happens. The reaſon whereof without doubt conſiſts in this, that the Animal ſpirits being put to flight and forced into freſh diſtractions, they relinquiſh their former diſorders; moreover, the convulſive matter is either diſſipated by that diſturbance, or is forced into other nerves where it is leſs troubleſome.

Frights profit in this Cough.

The Empirical cure of this diſeaſe being deſcribed after this manner, together with the remedies vulgarly uſed, and the rendring a reaſon of the cauſe at leaſt probably unfolded, from hence it will be lawfull to deſign a rational method of curing, and perhaps more efficacious againſt childrens Coughs of this kind. Wherefore, in ſuch a caſe ſometimes ſucceſſefully enough I have preſcribed according to the following forms. And ſeeing we ought to begin with purging,

The rational cure.

Take of the ſyrup of Peach flowers one ſpoonfull, of Aqua Hyſterica one ſcruple, mix it, and let it be taken with government. Purging.

Or, take of Mercurius dulcis 6 *grains, Scammony prepared with Sulphur, Reſine of Jalap, of each three grains; make a powder, give it in a little Pulp of a preſerv'd Cherry to a lad ſix years old, and let the doſe be encreaſed or leſſened according to the age, let the Purge be repeated in* 6 *or* 7 *days.*

If the Patient (as it often happens) be prone to vomit, Take of Oxymel of Squils 6 *drams, Salt of Vitriol* 4 *grains, mix it for a child of ſix years old, and according to this proportion let the doſe be accommodated to others. I have known a Vomit of this kind taken every morning for four or five dayes together with good ſucceſs.*

Veſicatories or Medicines drawing bliſters are in daily uſe, and are applyed ſometimes to the *Nucha* or nape of the neck, another while behind the ears, then to the inſide of the arms near the arm-pits, and as ſoon as theſe ſores begin to heal in theſe places, let others be raiſed in other places.

Veſicatories.

Inſtead of Beer let the following Decoction be uſed for ordinary drink:

Take China-roots an ounce and half, of all the Sanders of each half an ounce, the ſhavings of Ivory, and Harts-horn of each three drams, let them be infuſed and boiled in ſix pints of ſpring water to the conſumption of half, adding Raiſins ſtoned an ounce and half, Liquoriſh three drams.

Mixtures. *Take of Spirit of Gum Ammoniac with Salt Armoniac a dram, Syrup of Chin-moſs three ounces, Aq. hyſterica an ounce: the doſe is a ſmall ſpoonful in the evening and morning faſting.*

Or, *Take of tincture of Sulphur two drams, doſe three drops in the evening and firſt in the morning in a ſpoonful of the Syrup of Cup-moſs.*

To ſome endued with a hot conſtitution, and while they cough their countenance is ſpread with redneſs, or rather blackneſs, I have preſcribed Phlebotomy or drawing of blood with Leeches to two or three ounces with good ſucceſs.

Take Hog-lice living and cleanſed two ounces, powder of Aniſeed a dram, Nutmeg half a dram, fine Sugar an ounce, bruiſe them together, and pour upon them ſix ounces of Hyſſop-water, of Magiſtral Snail-water two ounces, ſtir them together a little, and preſs them out hard: the doſe two or three ſpoonfuls twice a day.

Hitherto of a Cough and its Remedy, while it is only an entrance to a Conſumption; now it remains to treat throughly of the diſtemper it ſelf, having paſſed the limits of this dangerous diſeaſe, and to deſign a method of curing, and the forms of remedies, which are proper to heal an inveterate Cough, when either being neglected, or not eaſily giving place to remedies, it begins to degenerate into a Phthiſis; namely when it arrives to that ſtate, that the blood being diſſolved in its conſiſtence, doth not only pour out the ſuperfluous Serum, but alſo the nutritive Juice, and perhaps the nervous, the Lympha, and other its ſuperfluities on the Lungs, and lodges them within its paſſages; and in the mean time the corruption of the Lungs is ſo much increaſed, that the little Bladders being diſtended, or many of them broke into one, ſo that a ſolution of continuity or an Ulcer being cauſed, a greater plenty of corruption is daily heaped in; and moreover the matter in that place gathered together, becauſe it is ſuffered to abide there long, putrifies, and for that reaſon doth ſtill more corrupt the Lungs themſelves, and defile the blood flowing through. In this caſe the Therapeutical indications ſhall be chiefly theſe three: *viz.* in the firſt place to ſtop the diſſolution of the blood, which is the root of all this evil, and to make proviſion that it pour not out the matter any longer in ſuch abundance upon the Lungs. Secondly, by expectorating the purulent matter heaped up within the Lungs, and to evacuate it quickly and ſufficiently. Thirdly, to ſtrengthen and dry the Lungs looſned from their unity, or being too looſe or moiſt or otherwiſe infirm, leſt they be daily more and more corrupted, and give more reception to the morbific matter. Every of theſe indications ſuggeſts various intentions of healing, and requires remedies of divers kinds and many ways of adminiſtrations. The chief of which we ſhall here briefly treat of.

Of what ſort the beginning of a conſumptive Cough is.

Three indications concerning its cure.
1. *To ſtop the diſſolution of the blood.*
2. *To draw out the filth from the Lungs.*
3. *To heal the Lungs hurt.*

The firſt indication ſuggeſts three intentions of healing.

1. Therefore what the firſt indication ſuggeſts, that the diſſolution of blood may be prohibited, theſe three things (as much as may be) ought to be procured: *viz.* Firſt that the maſs of blood may contain and aſſimilate whatſoever of nutritive juice it may be furniſhed with; and that it be ſo proportioned, that it neither offend in quality nor in quantity. Secondly, that the acidities either generated in the blood, or poured into it from ſome other place, may be ſo deſtroyed, that the blood retaining as yet its mixture or temperament, may not be prone to flowings and pourings out. Thirdly and laſtly, that all the excrements produced in the blood may be derived from the Lungs to other Emunctories and places of Evacuations.

The firſt intention, that the nutritive juice may be proportioned to the blood and aſſimilated by it.

1. As to the firſt intention of healing, *viz.* that the nutritive Juice may be proportioned to the blood, let it be adviſed before all things, that they who cough and are phthiſical abſtain chiefly from drink, and that they take liquid things in a very ſmall quantity; for that the blood being infirm in its temperament, ſo long as it is not too much imbued with freſh juice, may be able to digeſt ſmall portions, and retain it within its own conſiſtence. Moreover, let that freſh juice conſiſt of ſuch kind of particles, which being mild and thin, may be tamed by the blood, and aſſimilated without any effervеſcence or heat. Wherefore Aſſes milk, alſo ſometimes Cows or Goats milk; alſo Water-gruel, Cream of Barley, Ptiſan, Almond-milks, and other ſimple nouriſhments will better agree and nouriſh more than Fleſh, Eggs, and Gelly-broaths,

broaths, ſtrong Ale, Wine, or any other kind of richer fare. Secondly, that the blood retaining its own temperament, be not eaſily diſſolved into ſeroſities injurious to the Lungs, it behoves that as well the acidities of it ſelf as of other humors mixt therewith, and chiefly the nervous and limpid ones be deſtroyed: which intention Medicines prepared with Brimſtone will beſt accompliſh; which for that cauſe in this caſe (provided a hectic Feaver be not preſent) may be more frequently and in abundance taken. Wherefore the Tincture, the Balſam, the Syrup, the Flowers, and Milk of Sulphur in ſomewhat a large Doſe may be exhibited twice or thrice a day. For the ſame reaſon traumatic or vulnerary Decoctions, alſo Decoctions of the pectoral Herbs commonly ſo called, alſo of the Woods, are to be taken inſtead of ordinary drink. Moreover the Powder of Crabs eyes, Hog-lice, and other things endued with an Alcali or volatile Salt are often adminiſtred with great ſucceſs. The third intention of healing reſpecting the firſt indication, *viz.* that the ſuperfluous dregs of the depraved blood, (if they ſhall be very much predominant) being commanded out from the Lungs, may be diſcharged by other Emunctories, ſuggeſts very many ways to be uſed for their diſpatch. For beſides Phlebotomy, Diureſie, and ſometimes a gentle Purgation (which take place in all Coughs, yea in the beginning of a conſumptive Cough, or Phthiſis) hither alſo ought to be referred Baths, taking in a more warm air whereby they may more freely tranſpire, alſo Frictions of the extreme parts, Dropaces, Iſſues, Bliſterings, or Depilatories, Errhines, Gargles, and other private or public ſluices either of humors or vapors.

2. That the acidities of the blood and other humours be taken away.

3. That the excrements of the blood be drawn off from the Lungs.

The ſecond indication in the beginning of a Phthiſis, *viz.* that the conſumptive matter laid aſide within the Lungs may be eaſily and daily evacuated, is performed by expectorating Medicines. Theſe are ſaid to operate after a twofold matter, according to which their virtue is conveyed two ways to the Lungs. For of thoſe being taken by the mouth, ſome immediately diſmiſs their active particles into the *Trachea*, which partly by making the way ſlippery, and looſning the matter impacted, and partly by provoking the excretory Fibres into Convulſions, do procure expectoration: in which number are chiefly accounted Linctus's and Fumigations. The expectorating Remedies of another kind, which deſervedly are accounted more available, do exerciſe their energie by the paſſage of the blood. For whereas they conſiſt of ſuch kind of particles which cannot be digeſted and aſſimilated by the maſs of blood, being ſpread through the blood, becauſe they cannot be mixt with it, they are preſently again exterminated, and ſo penetrate from the pneumonic Arteries into the tracheal paſſages; where lighting on the matter they divide, and attenuate, and ſo diſturb it, that the little fibres being irritated from thence, and ſucceſſively contracted while they cough, the contents of the Trachea and of its little bladders are ejected upwards into the mouth. Medicines proper for this uſe beſides Sulphur and the preparations of it, are artificial Balſams diſtilled with Oil of Turpentine, Tinctures and Syrups of Gum Ammoniac, Galbanum, Aſa fœtida, Garlick, Leeks, and ſuch like yielding a ſtrong ſcent; from which alſo Lohochs and Eclegma's are prepared. And theſe work both ways, partly by ſlippinginto the Trachea, and partly by entring the Lungs by the circulation of the blood, and aſſault the morbific matter both before and behind, and ſo exclude it with the greater force.

Second indication requires expectorating Medicines.

3. What belongs to the third indication, *viz.* that the frame of the Lungs being hurt, or their conſtitution vitiated, may be either reſtored or amended; ſuch things are of uſe as reſiſting putrefaction do cleanſe, heal, dry, and ſtrengthen; to which intent alſo Remedies prepared of Sulphur, Balſamics and Vulneraries do agree. Hence ſome Empirics do not only ſucceſsfully preſcribe the ſmoak of Sulphur vivum, but alſo of Auripigmentum, to be ſuckt through a Pipe or Funnel into the Lungs. Moreover it is for this reaſon, that change of air and ſoil, *viz.* from Cities to the Country or ſulphureous air, or the paſſage from one Region into another that is hotter, is of ſuch a ſignal advantage.

Third indication is performed by Balſamicks and vulneraries.

Hitherto of the Method of Healing, which ſeems to be of uſe againſt the more painful Cough, or Phthiſis beginning; now it remains according to all thoſe curatory indications to ſubjoin certain ſelect forms of Medicines, which alſo, according to the way of healing deſcribed above in a ſlight Cough which is ſhort of a Phthiſis, we ſhall diſtinguiſh into certain ranks, *viz.* which are Mixtures, Linctus's, Lohochs, Tinctures, Balſams, Troches, Lozenges, Powders, Pills, Decoctions, and diſtilled Waters. We ſhall ſet down ſome Examples of each of theſe: whereto alſo may be referred ſome of the forms of Medicines before deſcribed for a beginning Cough, and not as yet conſumptive.

Forms of remedies for a conſumption.

1. Magiſterial Medicines and Syrups.

Mixtures.

Take of our Syrup of Sulphur three ounces, water of Earth-worms an ounce, tincture of Saffron two drams, mingle them. Take one ſpoonful at night, and firſt in the morning.

Take of Syrup of the juyce of Ground-Ivy three ounces, Snail-water an ounce, flour of Brimſtone a dram, mix them by ſhaking. The Doſe one ſpoonful at night and morning.

Take of tincture of Sulphur two drams, Laudanum tartarizated a dram, Syrup of the juice of Ground-ivy two ounces, Cinamon-water two drams: the doſe one ſpoonful at bed-time, and if ſleep be wanting, towards morning.

Syrupus Diaſulphuris.

Syrups.

Take of Sulphur prepared after our manner half an ounce, beſt Canary-wine two pints, let them be digeſted 28 hours in a water or ſand Bath; which being done, take of the fineſt Sugar two pounds diſſolved in Elder-flower-water, and boil to a height to make tablets: afterwards pour to it by little and little Wine coloured with Sulphur and warm, let it boil a little on the fire, ſtrain it through woolen. You will have a moſt delicate Syrup of a gold colour, and for coughs and other diſtempers of the lungs (where a hectic Feaver and heat of the Præcordium is abſent) moſt profitable: the doſe a ſpoonful morning and evening by it ſelf or with other Pectorals.

Syrup of Garlick.

Take ten or twelve cloves of Garlick ſtript from the little skins, and cut into ſlices, Aniſeeds bruiſed half an ounce, Elicampane ſliced three drams, Liquoriſh two drams, let them digeſt for two or three days in a pint and half of ſpirit of Wine cloſe and warm; ſtrain it clear and hot into a ſilver diſh, and add a pound and half of fine Sugar, the diſh ſtanding upon hot coals, let the liquor be fired, and while it burns ſtir it; and ſtrain it through woollen, and keep it for uſe.

Syrup of Turneps.

Take Turneps ſliced and fine Sugar of each half a pound, put them in a glaſed pot a lay of Turneps and a lay of Sugar, the pot being covered with paper, put it into an oven to bake with the bread; when it is taken out, preſs the liquor, and keep it for uſe: the doſe one ſpoonful morning and evening.

Syrup of Snails.

Take freſh Snails with their ſhells n. xl. cleanſe them with a linen cloth, afterwards each being run through with a bodkin, let the open ſhell be filled with powder of Sugar-candy, and being put in a linen bag, let them be hung in a cellar, it will diſſolve into a Syrup and drop into a glaſs veſſel ſet under it: the doſe one ſpoonful twice or thrice a day in a convenient vehicle, viz. *Milk-water or pectoral Decoction.*

2. & 3. Linctus's and Lohochs.

Linctus's.

Take of conſerve of red Roſes three ounces, of our tincture of Sulphur two drams, mix them in a glaſs mortar: the doſe the quantity of a Nutmeg evening and morning. To this ſometimes to appeaſe a troubleſom cough add from half to a dram of powder of Olibanum.

Lohoch.

Take conſerve of red Roſes four ounces, flour of Brimſtone four ſcruples, fine oyl of Turpentine a dram, powder of Fox-lungs three drams, ſyrup of the juice of Ground-Ivy as much as will ſuffice to make a ſoft Lohoch, to be taken after the ſame manner, viz. *morning and evening; alſo to be licked at other times with a Liquoriſh-ſtick.*

Take powder of Sugar-candy four drams, tincture of Sulphur two drams, mix it in a glaſs mortar: take it after the ſame manner.

In the place of Tincture of Sulphur may be adminiſtred other balſamic Tinctures, *viz.* Balſam of Peru, Opobalſamum, Gum of Ivy, Guajacum, Amber, with many others, which either may be mixt with Conſerve of red Roſes, or with the Conſerve of the flowers of Colts-foot, or with Sugar-candy.

4, 5. *Tinctures* and *Balſams* of the ſame nature and compoſition, but in a larger Doſe are convenient in a Phthiſis, which we have above preſcribed for a beginning Cough.

Take

Take of Tar an ounce, Lime-water thrice cohobated two pints, diſtil it in a Bath to half; afterwards being filtrated, let it be drawn off to the conſiſtence of Honey in Balneo; to which pour half a pound of tincture of ſalt of Tartar, let it digeſt in a cloſe glaſs to extract the tincture: the doſe from 20 drops to 30 in a fit vehicle. After the ſame manner is prepared the tincture of the black oyl of Soot, liquid Amber, liquid Storax, and many others. Tinctures.

Take of our prepared Sulphur an ounce, adding Mirrh, Aloes, and Olibanum in treble quantity, draw off a tincture with oyl of Turpentine, alſo with rectified ſpirit of Wine: doſe from 15 drops to 20.

6, 7, 8. *Troches, Lozenges,* and *Powders*, becauſe they chiefly reſpect a Cough, are almoſt of the ſame nature and compoſition with thoſe before-deſcribed for a new Cough; unleſs that for the drying and healing of the Lungs things ſulphureous and Vulneraries are required in a greater proportion.

Take powder of the leaves of Ground-Ivy a dram, flour of Brimſtone two drams, of Sugar penids a dram and half, with juyce of Liquoriſh diſſolved in Hyſop-water make troches of the weight of half a dram. Troches.

Take of Yarrow bruiſed and dried in the Sun half a dram, flour of Brimſtone, Olibanum, of each a dram; powder of dried red Roſes half a dram, Sugar diſſolved and boiled to a height ſix drams, oyl of Aniſeeds a ſcruple and half, make Lozenges of half a dram weight: take one three times or oftner in a day, and eſpecially evening and morning. Powder.

9. Pills.

Take a pint of the juyce of Ground-Ivy clarified in the Sun, flowers of Colts-foot dried, the tops of Hyſop, Sage, Pennyroyal, each a handful; Aniſeed, Caraway-ſeeds, ſweet Fennel-ſeeds bruiſed, each half an ounce; diſtil them in Balneo Mariæ to half; ſtrain it and diſtil it to the conſiſtence of Pills, by adding half a dram of juyce of Liquoriſh, powder of Elicampane, flour of Brimſtone, each three drams; flowers of Benzoin a dram, Balſam of Peru *half a dram, tincture of Sulphur three drams, tartarizated Laudanum two drams: make it into a maſs, and form it into ſmall Pills to be taken three or four evening, and firſt in the morning.* Pills.

10. *Decoctions*, as I have above preſcribed for a ſtubborn Cough, are uſed with ſucceſs againſt a beginning Phthiſis. In a caſe almoſt deſperate I have preſcribed the following Decoction to be taken twice a day, and alſo inſtead of ordinary drink with very good ſucceſs. Decoctions.

Take Lignum vitæ four ounces, China, Saſſaphras, each two ounces; of all the Sanders each an ounce, ſhavings of Ivory, Harts-horn, each three drams: infuſe them, and boil them in twelve pints of Spring-water to half, adding Liquoriſh an ounce, Raiſins ſtoned four ounces: ſtrain it.

11. *Diſtilled Waters*, ſuch as we have before preſcribed, are ſpecific here, whereto may be added Solenander-water of Hogs blood and Turpentine; alſo Balſamic Waters diſtilled from Turpentine with Pectoral Ingredients. Diſtilled Waters.

Take leaves of Ground-Ivy, white Horehound, Hyſop, Pennyroyal, each three handfuls; roots of Elicampane, Orris of Florence, *each two ounces; Turpentine diſſolved in Oyl of Tartar four ounces, Hyſop-water four pints, Malaga-wine two pints; diſtil them in a ſand Bath: let all the liquor be mixed, the Oyl ſeparated: the doſe two or three ſpoonfuls twice a day, with a ſpoonful of Syrup of Ground-Ivy.*

12. *In the laſt place* we muſt deſcribe the forms of Vapors and Fumes; the adminiſtration whereof doth uſe to profit more than any other remedies in a Phthiſis not yet deſperate, for that they arrive at the very Lungs, and ſo purge them by an immediate affect, dry them, and keep them from putrefaction, ſtrengthen and open all their paſſages. 1. Therefore a moiſt ſteam may be made after this following manner. Fumes and Vapours.

Take leaves of Hyſop, Ground-Ivy, white Horehound, each two handfuls; Elicampane two ounces, Calamus aromaticus half an ounce, Aniſeeds and Caraway-ſeeds, each an ounce: boil them in a ſufficient quantity of Spring-water: let the vapor of the hot ſtrained liquor be drawn by the lungs through a paper rolled up like a cone or funnel: and uſed morning and evening for a quarter of an hour. Formules of the former.

2. A

2. A fumigation or dry vapour, is made one while more mild out of meer Balſamics, another while more ſtrong out of Sulphurs, and ſometimes out of Arſenicals.

Forms of the more gentle Fume.

Take of Olibanum, white Amber, Benzoin, of each two drams, Gum Guaici, Balſam of Tolu *of each one dram and half, powder of red Roſes, and red Sanders, of each one dram to be ſtrewed upon burning coals.*

Of the more ſtrong.

Take Gum of Ivie, Frankincenſe, of each two drams, Flower of Brimſtone one dram and half, Maſtich one dram, with a diſſolution of gum Tragacanth, form Troches.

Arſenicals.

Take of white Amber, Olibanum, of each two drams, prepared Orpiment half an Ounce, Styrax, Labdanum, of each one dram and half, with ſolution of Gum tragacanth, make Troches for fumigation.

Smoak of Auripigment.

Mountebanks do ordinarily preſcribe the ſmoak of Arſnick to be ſuckt into the mouth, like Tobacco kindled in a Pipe, and ſometimes with good ſucceſs: Moreover, it is in practice with the Vulgar, to burn like Tobacco in a Pipe little bits of cloth ſtained with Arſenick (ſuch as wherewith the walls of Taverns are hung) and ſo ſuck the ſmoak into the conſumptive Lungs for cure.

Of a confirm'd Conſumption.

3. Theſe things being thus unfolded concerning a Cough, and a Phthiſis beginning, both as to what belongs to the Pathologie, and cure; it remains now laſtly to diſcourſe of a more painfull Phthiſis confirm'd, and almoſt deſperate; and to conſult what is to be perform'd, when the lungs being very much vitiated, and affected with one or more filthy ulcers, neither the air nor the blood do rightly paſs through them, but choak or corrupt the maſs thereof, by continually ſuggeſting filthy corruption; inſomuch that a hectick feaver and an Atrophie, by reaſon of nouriſhment being fruſtrated, infeſt the diſeaſed, with the loſs of all their faculties, and by daily weakening their ſtrength precipitate them to the grave. The moſt certain ſign of this diſeaſe growing deſperate, uſes to be accounted a pain very troubleſome with an inflammation of the throat; for this ſymptom argues a great putrefaction of the lungs, from whence the putrid *effluvia*'s exhaling are thrown about in the narrow paſſage of the throat, which wound and grievouſly irritate thoſe tender fibres there. In this caſe the cleanſing of the lungs, as alſo the drying up of the Ulcer are in vain deſigned: for all hotter Medicines ordain'd for thoſe purpoſes, and fit enough in the beginning of a Phthiſis, are not to be endured in a confirmed one; inaſmuch as augmenting the inflammation of the lungs, they procure a hectick feaver, thirſt, watchings, and other more painfull ſymptomes, or call them back afreſh. For truly in ſuch a ſtate of this diſeaſe where onely the prolongation of life is propoſed with a light toleration and an eaſie death; thoſe remedies help chiefly, which bridle the fervour of the blood, allay the heat in the *Præcordia*, and reſtore the ſprits, and gently cheriſh them. Hence for food, Aſſes Milk, alſo Water-gruel, Barly-broths, Cream of Barly, and for drink, Ptiſan, Emulſions, water of milk diſtilled with Snails and temperate pectoral herbs, are uſually of greateſt ſucceſs. Syrups and Linctus's, which appeaſe the inflammation of the throat and Lungs, and facilitate expectoration, but chiefly the more mild Hypnoticks, whereby moderate reſt may be procured, may be frequently or daily taken. The forms of theſe are common enough; but however according to our method, we will annex ſome of the more ſelect of each kind.

The formal reaſon thereof.

Forms of remedies in a deſperate Conſumption.

Decoctions.

Take of Barly half an ounce, candied Eringo roots 6 drams, parings of Apples one handfull, Raiſins ſtoned two ounces, Liquoriſh three drams, boyl them in three pints of ſpring-water to two, make a Ptiſan to reſtrain thirſt: take it 3 or 4 times a day, alſo in the room of ordinary drink if it agree.

Take the tayls of twenty Creviſes, candied Eringo roots one ounce, a cruſt of white-bread, Raiſins ſtoned two ounces, Liquoriſh 3 drams, boyl them in 3 pints of Spring-water to two, ſtrain it, and take 3 or 4 ounces three times a day. After the ſame manner is prepared the Decoction of Snails.

Diſtilled waters.

Take of Snails half-boyled and cut three pound, ground-Ivy 6 handfulls, Nutmegs ſliced numb. 6. crum of white-bread two pound, freſh milk 8 pounds, diſtill it in a Pewter Still. The ſame way is diſtilled the water of Creviſe-tayls. The doſe 3 or 4 ounces three times a day, ſweetned with pearl'd Sugar or Sugar of Roſes.

Hypnoticks.

Take ears of greeen Wheat as many as convenient, diſtill them in a common ſtill; drink three or four ounces three times a day, ſweeten'd with pearl'd Sugar.

Take

Take ſyrup de Meconio *three ounces, water of green Wheat 6 ounces, mix them, drink two or three ſpoonfulls at bed-time, every or every other night.* *Hypnoticks.*

Take Conſerve of Mallow-flowers wild or garden three ounces, Lohoch de pino *two ounces, Syrup of Jujubes two ounces, make a Lohoch, of which take often a dram and half or two drams.* *Eclegma's.*

What hitherto we have diſcourſed of concerning a Cough of every kind (whether it be ſolitary and ſimple, or the forerunner and companion of a Phthiſis) alſo what is to be preſcrib'd in every caſe touching the method of healing, it would be eaſily illuſtrated by the hiſtory of Cures, or by the Anatomical obſervations on thoſe that have dyed by that diſeaſe. For inſtances of this ſort, and very many examples are every where had, and happen daily; it pleaſes us here to annex a few of the more ſelect, out of the large choice of theſe, accommodated to the chief kinds of a Cough, and Phthiſis. And firſt I will endeavour to illuſtrate the type of a ſimple Cough by one hiſtory or two, and which takes its riſe of it ſelf, and is altogether void of the ſuſpicion of a Phthiſis.

The Hiſtory of a Cough threatening a Conſumption.

It is now many years ſince I took care of the health of a certain Student, obnoxious to a Cough from his tender years, and who was wont frequently to undergo the more painfull affections of it, and thoſe of long continuance. This perſon ſeemed of a melancholick temper, of a ſharp wit, of an indefatigable ſpirit, of a conſtitution indifferently ſtrong, but that his Lungs originally being infirm, did ſuffer when the blood diſſolv'd into ſeroſities. In Summer as long as he tranſpired freely, he lived healthily enough; but in the Spring and Autumn, when the blood changing its temperament, thoſe ſerous fluxes came upon him either of their own accord, or from any ſleight occaſion, he fell eaſily into a Cough with abundant and thick ſpittle; notwithſtanding this diſtemper frequently within ſix or ſeven dayes, as ſoon as the maſs of blood was purged throughly by the Lungs, vaniſhed leiſurely without any great uſe of remedies. But if to the aforeſaid occaſions of this diſeaſe were added ſome ſtronger cauſes, as chiefly the obſtruction of the pores, and errors touching his diet, ſometimes a more prodigious and ſtubborn cough, neither preſently nor eaſily yielding to remedies, and threatning nothing leſs than a Phthiſis, did come upon him; then manifeſtly the patient for the firſt days ſuffered light ſhiverings in his whole body, and the ſenſe of a Catarrh in his *Larynx*; afterwards by frequent coughing with thin ſpittle, together with a giddineſs, he was afflicted with numneſs of his ſenſes, and a dropping at his noſtrils.

In this ſtate his beſt remedy was wont to be, and frequently tryed with ſucceſs, to drink a little more freely generous Wine, and any other liquor very ſparingly: for ſo the acidity and fluor of the blood being ſuppreſſed, and tranſpiration procured more freely, he was much eaſed, and ſometimes recovered health in a ſhort time. Moreover at night and early in the morning he was uſed to take ſeven or eight drops of the tincture of Sulphur in a ſpoonfull of Syrup of Violets, or of the Juice of Ground Ivy, or

Take Conſerve of red Roſes three ounces, ſpirit of Turpentine two drams mingled, the doſe the quantity of a cheſnut evening and morning.

If that theſe remedies together with the *Canary* Antidote and thin diet effected little, the diſeaſe not being ſo cured, ſpinning out into a long period, and preſſing him ſharply for many weeks, yea ſometimes months, it reduced the ſick to a remarkable leanneſs, and to the very brink of the Grave. For then the Cough daily encreaſing and being very troubleſome, did very much impede and break his ſleep, his ſtrength languiſhed, his appetite was dejected, heat and thirſt moleſted him; in the mean time ſpittle every day encreaſed, and was caſt forth in great plenty; ſo that not onely the *Serum* of the blood, and the recrements, but alſo the nutritive Juice, and the drainings of the ſolid parts being continually poured out upon the lungs, turn'd into corruption, which was abundantly cough'd out; moreover his breath was difficult, his joints very infirm, and his fleſh very much conſumed.

When of late our patient laboured after this manner, we preſcribed the following method, and remedies, by the continued uſe whereof at length he recovered his health. Firſt of all, a thinner diet being appointed him, and for the moſt part Ale being forbidden altogether, he took twice in the day of the following Apozeme about ſix ounces warm, and a little at other times cold to reſtrain his thirſt.

Take

Take of the roots of China two ounces, Sarsaparilla three ounces, white and yellow Sanders of each one ounce, Ivory and Harts-horn of each three drams; infuse and boyl them in 8 pints of water to half, adding Raisins of the Sun 3 ounces, Liquorish 3 drams, strein it, and keep it for ordinary drink.

Take tincture of Sulphur three drams, take from seven drops to ten, at night and in the morning, in a spoonfull of syrup of Violets, or of syrup of the juice of Ground-Ivy.

When he began by continual use to nauseate this Medicine, in its place the following Eclegma was appointed.

Take conserve of red Roses three ounces, spirit of Turpentine two drams, mix them; the dose is one dram, at the same hours.

Afterwards instead hereof the following Powder was sometimes taken.

Take of the powder of the leaves of ground-Ivy dryed in the Summer Sun three ounces, Sugar-candy half an ounce, mix them, the dose half a spoonfull twice in a day, with three ounces of the following water.

Take Ground-Ivy 6 handfulls, Hyssop, white Hore-hound, of each 4 handfulls, Lambslungs half-boyl'd and cut small, pour upon them eight pound of Posset-drink made with small ale, distill it in common Organs, the liquor being mixed, let it be sweetned to the taste as it is used with Sugar-candy or syrup of Violets.

Troches. To appease his almost continually troublesome Cough, he swallowed the following Troches, and sometimes a little of the extract of Liquorish.

Take of the species of Diatragacanth. frig. 3 drams, Annise, Carue, sweet Fennel-seeds, of each half a dram, flower of Brimstone two scruples, flowers of Benzoin one scruple, extract of Liquorish dissolv'd in Hyssop-water; make a paste which form into Troches.
Or,
Take of Species Diaireos, è pulm. Vulpis, of each two drams, flower of Sulphur, of Elecampane, of each half a dram, Oyl of Anniseeds ℈ß. Sugar dissolv'd in a sufficient quantity of Penniroyal-water and boyl'd to a body ℥vj. form Lozenges of half a dram weight, let him eat one, swallowing it by degrees, as oft as he will.

In the midst of this course, although he was endowed with a weak pulse and more cold temperature, we breath'd a vein in his arm: moreover, with these remedies, the chiefest help accrued to him from the open air, which for the most part he daily enjoyed, either by riding on Horse-back, or in a Coach; for from hence he first began to recover his appetite, his digestion, and sleep; whereto afterwards a relaxation of the other symptoms did sensibly follow, till at length he recovered his entire health. As often as he was afflicted since then with a stubborn and tedious Cough, he used a method like this, and with the like success; and now although he lives altogether exempt from that distemper, notwithstanding he is constrained to decline carefully all occasions or causes whereby either the pores might be shut, or the flux of blood or its precipitation into serosities might be provok'd; which were chiefly his going by water on the *Thames* at *London*, and drinking of acid liquors, as Cider, French or Rhenish wine.

From the above-mentioned history, you may easily conceive both the means and the reason of healing of the Cough, (which caused by the fault of the blood, is without the limits of a Phthisis): The other follows, which illustrates the nature of the same distemper, when it chiefly proceeds from the nervous juice.

The second remarkable History.

A hooping Cough.

A Boy about ten years of age, of a hot temper and fresh countenance, from his infancy obnoxious to a frequent Cough, in his succeeding years sustained more grievous and lasting fits and assaults of this distemper, and by turns was used to labour with a strong and shrill Cough, without spitting, which almost continually afflicted him day and night, and so infesting him many days, yea weeks, brought the sick to utter weakness. Afterwards the period of his disease being come (which happened not but by consuming the store of the morbific matter) he again in a short time became healthy enough, and very free from any sickness of the Thorax: till the morbific matter (as it seems) being heaped again to great abundance, without any evident cause, the same distemper

ſtemper returned and performed its Tragedy with its wonted fierceneſs. About its firſt beginning the Cough was troubleſom only morning and evening: afterwards the evil by little and little increaſing, he almoſt continually coughed whole days and nights, and if at any time ſleep happening of it ſelf, or by the uſe of Anodynes, afforded any truce, a more outragious fit of coughing ſucceeded his wakening. After this manner moſt frequently and fiercely coughing without any ſpittle, he laboured for three or four weeks, till he was brought to an extreme leanneſs and weakneſs; and then the ſickneſs leiſurely remitted, ſo that he coughed ſomewhat ſeldomer, and enjoyed moderate ſleeps; afterwards in few days growing very hungry, being quickly made full of fleſh and vigorous, he recovered his former health in a ſhort time. Fits of this kind more ſeldom infeſted him in Summer-ſeaſon, but in the reſt of the year, repeated three or four turns, and brought the ſick even into great hazard of life.

If diſquiſition be made of the nature, cauſes, and formal reaſon of this unwonted and as it were irregular kind of Cough, it is manifeſt it proceeds like all others, from the provocation of the Lungs; nevertheleſs as to the matter exciting, its ſeat, and manner of affecting it is doubted: becauſe neither thick ſpittle, nor plentiful thin (as is uſual in other diſtempers) is here caſt out; neither doth the Patient complain of feeling a Catarrh, nor of any weight of the Lungs. Wherefore, not as in a common Cough, does the ſerous humour either ſlowly or plentifully ſweating out of the Trachea or pneumonic veſſels into the little bladders or pipes of the Trachea, induce the afore-mentioned ſymptoms: But it is plain from thence that the paſſages of the *aſpera Arteria* are wholly empty of the ſerous or thick humour, becauſe the deep and ſounding Cough throws off nothing. Moreover, neither from the blood impacted in the Membranes of the Lungs, doth this Cough take its origine, becauſe neither feaver, nor thirſt, nor pain are preſent here as in a Peripneumonie. Beſides, neither doth the morbific matter ſeem to adhere to the nerves or muſcles appointed to the function of breathing; becauſe then beſides a Cough, Aſthmatical or otherwiſe convulſive fits would ſometimes urge with a ſenſe of ſtrangling; which notwithſtanding did not happen to our patient.

Having frequently and ſeriouſly meditated about the ætiologies of this very difficult caſe, I am at length induced to think, that a certain ſerous and ſharp matter, as being loaded with a ſcorbutical taint, falling from the head by the paſſage of the nerves, doth enter into the nervous fibres and Membranes of the lungs or Trachea; which cleaving throughly to them, is by degrees encreaſed to a fulneſs, and at length being chaf'd, and grown turgid with a perpetual provocation, creates ſo troubleſom a Cough. We have in another place declared the matter of this kind impacted in the Coats of the guts, and the neighbouring parts about them, not rarely to excite a ſcorbutical Colick, for many days, yea ſometimes weeks, infeſting them with vomiting and a moſt ſharp torment; and what elſe is this Cough, but a certain convulſive diſtemper of the lungs, whoſe taint notwithſtanding, according to the capacity of the part labouring, is impreſt rather and more on the motive, than on the ſenſitive Power. For the lungs however twicht and hurt, do ſuffer ſmall pain, or ſcarce any at all; notwithſtanding from any light occaſion, they are invaded by ſtorms and fits of coughing. Indeed we compare this diſtemper of coughing ſo much the rather to the Colick, becauſe the ſubjects of either of them, that is to ſay, the Trachea, and the guts, as to their coats, veſſels, little fibres and glandules, are after the ſame manner faſhioned.

The conjunct cauſe of the diſeaſe.

The chief cauſe of the Cough now deſcribed, depends upon the morbific matter heaped together within the little fibres of the rough arteries, to a provoking fulneſs; wherewith when they are loaded, firſt a quick and painfull breathing infeſts onely, with a mornings Cough; becauſe from the beginning onely ſome ſmall portion of that matter being diſquieted provokes the part: afterwards when the whole maſs thereof growing turgid, almoſt perpetually twitches the fibres, there follows a moſt troubleſom cough; which alſo being often repeated, endures a long ſeaſon; becauſe the morbifick maſs impacted in the parts affected, is neither preſently caſt off by the ſtrength of nature, nor eaſily gives place to any remedies.

For in all the fits of this diſeaſe, I have made tryal of various methods of curing, and of medicines of divers kinds, though with little ſucceſs. That diſtemper beginning at any time, is wont to make a long period, maugre all remedies. The medicines commonly called pectoral, as Syrups, Lohochs, Eclegma's, or Lambitives, have conferred little benefit to its cure; notwithſtanding ſometimes it hath ſeemed good to

admit of them into uſe for this purpoſe, that they might make ſlippery and moiſten the Lungs, leſt they run the hazard of being rent by a violent Cough, and their veſſels burſt aſunder: for ſometimes a more fierce fit troubling our ſick Patient, he hath been wont to cough out a little blood, though no thick ſpittle.

A gentle Purge both in the beginning and declination of this diſtemper hath ſucceeded well. Opening and diuretical Apozemes are ever adminiſtred with ſucceſs, both which he uſed enough through his whole courſe inſtead of ordinary drink. Evening and morning he took ſome drops of the Tincture of Sulphur with the Milk-water of Snails; late at night I was ſometimes conſtrained to adminiſter a Doſe of Diacodion or of liquid Laudanum: his belly for the moſt part looſe enough, that it ſeldom required Clyſters: in two of his fits he breathed a vein, whereby nothing of ſucceſs enſued.

The uſual method of curing. In the laſt fit, beginning about the Autumnal Equinoctial, which paſſed away a little more lightly and gently, this following method of healing was obſerved.

A Purge. Firſt of all this Purge was given, and after four days repeated. *Take of Mercurius dulcis ten grains, Reſine of Jallop four grains, mix and make a powder to be taken in a ſpoonful of Syrup of Violets.*

A Drink. *Take China-roots ſliced a dram, Graſs-roots three ounces, Chervil an ounce, candid Eringoes ſix drams, ſhavings of Ivory, Harts-horn, each three drams; Raiſins of the Sun ſtoned three ounces: boil theſe in three pints of Spring-water to two pints, ſtrain it, and uſe it for ordinary drink.*

A Mixture. *Take ſyrup of Jujubes two ounces, Diacodion an ounce, ſpirit of Salt Armoniac with Gum Ammoniac a dram, mix them: the doſe a ſpoonful at night and early in the morning. He was much relieved with this medicine, notwithſtanding he took it only every other or third day, and for change ſometimes a doſe of the tincture of Sulphur with ſyrup of Violets.*

The diſeaſe declining a Purge was twice repeated, and afterwards, recovering his health by degrees, within two weeks he became healthy enough. But when I beheld him not only obnoxious to frequent relapſes of coughing, but every fit to be irreſiſtible when it aſſaulted him, and its ſtay very long notwithſtanding the uſe of remedies, and all this threatning no leſs than a Phthiſis at length; I adviſed that as well for his preſervation, as for the more eaſie cure of the diſtemper, if it ſhould return, he ſhould travel into a hotter Region. Hereupon he did not much delay, but ſails into *France* about the beginning of *November*, and from thence by a ſtraight journey to *Montpelier*, where abiding half a year he was ſick only twice and both times lightly: afterwards returning into *England* quite free from a Cough, praiſe be to God he enjoys his perfect health.

SECT. I. CHAP. VII.

Of Spitting Blood.

HItherto of a Cough and Phthiſis, as well in its beginning as confirmation; which are the moſt common affects of the Lungs, and moſt eſpecially dangerous. Beſides which there are many other diſeaſes of thoſe parts that do occur, which when they are not at all, or not ſeaſonably enough cured, for the moſt part degenerate into a Phthiſis. Theſe paſſions, or at leaſt the chief of them, (as we have before hinted) are ſpitting of blood, an Impoſthume, or Ulcer of the Lungs, a Peripneumony, Empyema, a Pleuriſie, a Tumor of the Lungs, and obſtructions by reaſon of things divers ways concreted, *viz.* ſometimes little Puſtles and Scirrhus's, another while gravel and little ſtones, and ſometimes other preternatural matter; and laſtly hitherto belong an Aſthma and convulſive diſtempers of the Breaſt. Of theſe we ſhall treat in order, and firſt of Spitting blood.

Spitting blood a diſtemper very frequent. The ſpitting of blood out of the Lungs and the ejection thereof by Cough ſometimes leſs and almoſt none, another while more violent, is a diſtemper frequent enough, and truly an admiration it is, that it happens not more frequently. For whereas the veſſels bringing blood are divided into twigs and innumerable ſlips, and thoſe very ſmall; and whereas the blood even fiercely boiling, is violently conveyed through them all, complicated after divers manners and variouſly intorted; we can hardly conceive how the

the circulation thereof being ſo perplexed and intricate, and alſo ſo impetuous, ſhould be performed without ſome impediment and interruption. And truly we conclude it to be very difficult in living bodies, becauſe it hardly ſucceeds by injection in the dead: for as much as liquor ſent through the entrance of the pneumonic Artery, will not readily and eaſily return by the Veins; but ſticking longer in the paſſage, and skipping over the uſual paſſages, variouſly runs out into the little bladders and other canals of the Trachea, and into the interſpaces and other various gaps of the little Lobes.

Three things to be conſidered concerning it.

Concerning an Hæmoptoſis or ſpitting blood we are to conſider, firſt out of what veſſels, and by what diſtemper the blood burſts out; ſecondly in what places moſt frequently laid up; thirdly by what means it is wont either to be ejected or brought upward, that it may be diſcharged by the mouth.

Out of what veſſels the blood burſts out.

As to the firſt, we are to ſuppoſe by the Law of Circulation, that the blood of it ſelf burſting out, doth altogether proceed from the Arteries: for the Veins, as long as they remain whole, do reduce it towards the Heart, and not at all pour it out; although we deny not that ſometimes they being hurt by a wound, fall, bruiſe, or ſome violent accident, ſo as to be looſned from their unity, do let go the blood out of their cavities. Nevertheleſs the blood moſt commonly cauſing an Hæmoptoe or blood-ſpitting, proceeds from the little mouths of the Arteries being open or torn; and then the fault is wont to be either in the ill temperament of the blood, or ill framing of the veſſels.

By what fault both of the veſſels and of the blood it happens.

Of either of theſe there are various kinds and differences, which alſo concur after a diverſe manner to provoke the ſpitting of blood. For the blood being ſometimes more thin and alſo ſharp, it unlocks or corrodes the mouths of the little Arteries; and ſometimes again being more thick and prone to coagulate, when it cannot readily enough be received by the Veins, it is extravaſated. By reaſon of theſe faults in the blood, they who labour with the Scurvy or with a peſtilent Feaver, as alſo thoſe who have drunk ſome ſort of poiſon, do frequently fall into a ſpitting of blood. Neither is this diſtemper leſs wont to ariſe from the fault of the veſſels, in as much as thoſe being too tender or too thin, many times are burſt by a violent motion, as by coughing, hollowing, leaping, or other vehement exerciſes; or for that being too looſe and moiſt, their mouths open, and ſuffer the blood to break out of its circulation: moreover ſometimes for that the Veins being contracted and wrinkled by cold, do not readily paſs away the blood, but the ſame reſtagnating diſtends the little Arteries, and burſts out of their mouths.

What Arteries chiefly and where placed do void blood.

As to the Arteries, out of which the blood breaks, cauſing a ſpitting of blood, it concerns much of what ſort they are, and where they are placed; for beſides that there ariſe notable differences of bloody ſpittle, according as the blood breaks out from a ſmaller or a greater veſſel; and if either of them be placed in the top of the Lungs near the Larynx, or in the middle region thereof among the greater branches of the veſſels, or laſtly in the lower region among the orbicular little bladders: moreover we obſerve, that the Arteries which uſe to void blood, are either of the number of them, which ariſing out of the pulmonary Trunk, do every where accompany the branches of the Trachea; or of thoſe which owning their origine to the Aorta, do cover the coat of the Trachea with a thick branching.

Both the pneumonic and tracheal are in fault.

For it is apparent (as we have declared before) from the mouths of theſe, as alſo of the Glandules, an unctuous humor ſweats out to make the inner ſuperficies of the Trachea ſlippery: moreover in as much as a ſerous humor diſtils abundantly out of the ſame into the cavity of the rough Artery, a Catarrh ariſes. Wherefore we doubt not at all to affirm, that even from the mouths of theſe being open, meer blood ſometimes ſoaking into the Tracheal paſſages, does propagate a bloody ſpittle, though in quantity very ſmall. I have obſerved many, who without a Cough or any indiſpoſition of the Lungs, have once or twice a day voided one or two bloody ſpittles: which as often as it came upon them, the Patients perceived, either in the bottom of the throat, or on the top of the breaſt a kind of diſtillation; whence immediately by the meer contraction of the Tracheal Fibres, with a Snail-like motion, a little of the fluid blood being mixed throughly with flegm, and not at all frothy, is voided: and when ſometimes that diſtemper had laſted for many months, no prejudice enſued from thence, which might bring or threaten a Phthiſis: which would not have come to paſs, if any of the pneumonic Veſſels had been opened.

Spitting blood from the tracheal Arteries.

2. So much concerning Veſſels voiding blood, and of their divers affections. What belongs to the places wherein the extravaſated blood is depoſited, theſe chiefly and almoſt only are the rough Artery, and the inward cavity of the parts thereof. For into

2. In what places the blood is depoſited.

this, as into a Jakes, all the filth or ſuperfluities of all the reſt of the paſſages are derived by the utmoſt endeavours of Nature, as far as is poſſible, to be preſently ſent out of doors. But if the extravaſated blood be thrown into the interſpaces of the little Lobes, or ſoaking out of the outer Membrane, fall into the cavity of the *Thorax*, it doth propagate an Empyema, and frequently an Impoſthume in that place. But for the moſt part the blood ſubject to fall from the pulmonary courſe, produces various kinds of bloody ſpittle; according as it makes its neſt, either upwards within the cavity of the Larynx, or a little beneath about the intermedial paſſages of the Trachea, or laſtly further within the orbicular little bladders. The firſt diſtemper proceeds alone from the mouths of ſome Artery being opened, which covers the trunk of the Trachea; the next ſometimes perhaps from this cauſe, yet more often from the pneumonic Arteries themſelves being open or burſt aſunder, which veſſels as they are greater, pour out often a dreadful quantity of blood; the ſpitting out whereof proves plentiful and violent, in regard that the muſcles of the whole breaſt, together with the fibres of the Trachea are much provoked and greatly contracted. But if the ſpring of bloody ſpittle conſiſts in the lowermoſt little bladders, the blood is thrown out more ſparingly, but with a profound, frequent, and very troubleſom Cough.

Either in the Larynx, or in the middle of the Bronchii, or in the orbicular little bladders.

3. And from hence (which was in the third place purpoſed) the differences of bloody excretion out of the Lungs, and the manifold modes and courſes of bloody ſpittle are made known. For the blood ſoaking into the Larynx, after a ſmall tickling in the throat without coughing or hawking, doth eaſily and almoſt inſenſibly aſcend into the mouth: and if an extravaſation of this kind of blood happens in ſleep, it preſently flows out of the mouth upon wakening, they being ſcarce ſenſible of it; in as much as the moving fibres of the Trachea being contracted while one ſleeps, have then emptied the blood freſh diſtilled into the mouth. But if from a greater veſſel gaping or burſt about the middle of the Lungs, the blood (which is ever frothy) does break out abundantly into the Tracheal paſſages, this by an outragious Cough raiſed thereby is forthwith caſt upwards with violence and in great plenty; inſomuch that the ſick ſeem rather to vomit than cough out blood. And finally, if the blood breaking out of the foldings of the veſſels wherewith the orbicular little bladders are incompaſſed, falls down into thoſe little cells, from thence it is diſcharged by turns in leſſer quantity, and not unleſs by a ſtrong and very frequent Cough.

The procatarctic and evident cauſes thereof.

So much concerning the formal reaſon, the conjunct cauſes and differences of an Hæmoptoe: as to what belongs to the primary and evident cauſes, either of them are manifold and various. In the former number are reckoned, firſt an hereditary indiſpoſition of the Lungs, whenas they have originally been weak and ſoft with a ſtraitneſs of the breaſt. Moreover their ill temper from a Cough, Empyema, or Pleuriſie going before, and eſpecially an obſtruction or ill conformation do very much diſpoſe to ſpitting blood, and ſo much the rather, if in ſuch a habit an acrimony or Dyſcraſie of the blood ſhall accrue from an ill courſe of Diet, unwholeſom Air, or by any other means. The ſuppreſſion of the Menſtrua, the Hæmorrhoids, or blood flowing from the Noſtrils incline moſt to a ſpitting blood. Secondly, among the evident cauſes ought to be reckoned primarily the exceſs either of heat or cold; for when the blood grows above meaſure hot, or the tranſpiration thereof through the Pores of the skin is hindred; thereupon ſwelling after a huge manner, it frequently burſts out of the pneumonic Veſſels. From hence *Hippocrates* long ago obſerved, and as yet it is a vulgar obſervation, That ſpitting blood moſt frequently happens in the winter when the North-wind blows. Neither leſs ſeldom hath the uſe of bathing brought this evil upon many, before the uſe whereof they were healthful enough. Moreover many contract this from drinking of wine and ſtrong waters, from a blow, a fall, hollowing, vomiting, coughing, or any other violent ſtirring of the whole body or of the Lungs. Alſo certain poiſons, and according to *Heurnius* the Lunar beams (the reaſon whereof doth not eaſily appear, neither doth there remain any credit thereto) are reported to provoke this diſtemper.

The Progniſtics of this diſeaſe.

The Prognoſtics of this diſeaſe are enough known to the vulgar, whereas there is not any one of them, who doth not ſuſpect the ſpitting of blood as very dangerous. Nevertheleſs whereas the kinds hereof are various, one is found more or leſs dangerous than another. The blood ſoaking out of the veſſels of the Trachea is often free from any evil: moreover when breaking out from the loweſt and leſſer pulmonar Veſſels, it often admits of Cure; at leaſt it is much ſafer than a plentiful ſpitting of blood happening from the great branches of the Artery being opened into the Trachea. But the prediſpoſition of the Patient makes a great difference in the Prognoſticks of this diſeaſe:

eaſe: for if blood-ſpitting be provoked by reaſon of a ſolitary evident cauſe, and ſhall happen to a body formerly ſound and well ſet, there appears far greater hope of help, than if the diſtemper ariſing of its own accord ſhall happen to a cachectical, phthiſical, ſcorbutic, or otherwiſe ſickly body. However 'tis a common obſervation, that this diſeaſe is dangerous and always difficult to cure: the reaſon whereof is alſo clearly manifeſt, for as much as the function of the Lungs conſiſting in a perpetual motion, is altogether contrary to the method of healing a wound, whereto primarily eaſe and reſt are required. In like manner this happens to be a greater hindrance to its Cure, in as much as the frame of the Lungs is not a Parenchyma (as was thought) but a texture or very ſubtile web of innumerable veſſels; the unity whereof if once diſſolved, it will be altogether impoſſible for the ends of the disjoined veſſels to meet again together, or the ſpace to be filled up with fleſh or callous, as in other parts. But there is this only to be hoped, that while the ends of the veſſels grow together incongruouſly and always imperforated, the circulation of the blood ceaſing in the part diſtempered, may be ſupplied by another neighbouring part: which indeed rarely ſucceeds without hurt or prejudice of the whole Lungs.

As to what appertains to the Method of healing the Hæmoptoe or ſpitting blood, the curative indications ſhall be chiefly theſe two, *viz.* to ſtay preſently and reſtrain the flux of blood; then ſecondly, to heal the diſſolution of unity without any relicts of a Conſumption in the Lungs. *The Cure thereof.*

I. As to the former, theſe two things are chiefly to be procured, *viz.* firſt that blood flow not to the part diſtempered; and ſecondly, that in the mean time the opening of the veſſel may be ſome-how ſhut. I. *Indication.*

1. That the blood may not flow to the part diſtempered, there are many intentions of healing in uſe, *viz.* it will be requiſite to diminiſh the abundance of blood, to reſtrain the boiling thereof, to alter the intemperament, and depreſs its motion or divert it another way: for which purpoſes Phlebotomy, Ligatures, and Frictions are often convenient: alſo Juleps, Decoctions, Emulſions, and ſucculent Expreſſions of Herbs ought to be drunk. Likewiſe moderate Hypnotics, and in the firſt place Diacodiates are exhibited with ſucceſs: for theſe, by reſtraining the motion of the Heart, do force the blood to cool. 1. *It ſtops the flux of blood.*

2. That the opening of the veſſel may be ſhut, aſtringent and agglutinating remedies are in the firſt place convenient. The chief of theſe are uſed to be exhibited in the form of a Linctus, ſo that while one ſwallows, certain particles gliding into the rough Artery, may more immediately communicate their power to the part diſeaſed. But the reaſon of this operation ſeems not to be of any great moment; becauſe the efficacy of the Medicines themſelves, chiefly and almoſt only by the conduct of blood reaches to the ſeat of the diſeaſe. Wherefore not only Lohochs, but alſo Decoctions, Powders, and Pills of vulnerary and balſamic Ingredients are preſcribed with ſucceſs. The forms hereof we ſhall annex beneath. 2. *It ſhuts the opening of the Veſſels.*

II. The ſecond indication, which is alſo preſervatory, reſpecting the healing of the diſſolution of unity without any remaining hurt of the Lungs, ought to provide againſt two ſorts of evils, *viz.* leſt the ſpitting blood (whereunto the diſtempered are afterwards always prone) begin again; and leſt a Phthiſis ſucceed, which threatens every body ſubject to the Hæmoptoſis. For theſe ends for the prevention of this diſeaſe daily care and conſtant courſe of healing ought to be miniſtred to the blood and Lungs. II. *The ſecond preſervatory indication.*

1. As to the blood, the maſs thereof ought to be contained ever in a due quantity, and a right temperament, with a mild and equal motion. Hence leſt it ſuperabound, or diſtempered with a Dycraſie enter into turgeſcencies, or lodge its impure feculencies in the breaſt: it is requiſite ſometimes to uſe Phlebotomy and a gentle Purgation. An exact courſe of Diet is always neceſſary. Moreover for the depurating and ſweetning the blood, drinking of Aſſes milk, or of Medicinal waters ſometimes does greatly help. But Decoctions, diſtilled Waters, Juices of Herbs, which carry away the ill temperaments of blood, and derive the Serum and other impurities from the Lungs, and bring them forth either by Sweat or Urine, are to be carefully drunk. Beſides for this purpoſe Iſſues do chiefly conduce. 1. *It reſpects the blood which is to be kept in a right Craſis.*

2. Neither ought there to be leſs care of the Lungs themſelves, namely that the whole frame thereof, and chiefly the place affected, be preſerved in due frame and right tone. Hence every violent motion, whereby its unity is more diſſolved, or the reſtitution thereof hindred, ſhould be induſtriouſly declined. Let the party live 2. *A due frame of the Lungs to be procured.*

in

in a clear and open air, but not too fierce, or ſharp; let him abſtain from groſſer foods, from Noon-ſleeps, from plentiful Suppers, and other errors in diet, which induce either repletion or obſtruction upon the *Præcordia*. But let remedies be admitted in daily uſe, which by a peculiar property, or certain ſpecifick vertue are reported to heal the Lungs.

The method of healing requiſite for ſpitting of blood, being ſhadowed after this manner, there yet remains as to all the therapeutic indications, and according to the various intentions of healing which belong to them, for us to ſubjoyn ſome more choice forms of Remedies, whoſe Van thoſe deſervedly lead which meeting with the ſymptom moſt urging, do ſuddenly reſtrain the flux of blood caſt out by coughing or otherwiſe out of the Lungs. In the firſt rank of theſe Medicines thoſe are reckon'd which hinder the blood from flowing to the part affected, and together are impregnate with a certain aſtrictive and agglutinative power whereby the opening of the veſſel may be ſhut; and after the Belly being cleared with a Clyſter, and Phlebotomie (unleſs a weak pulſe and defect of heat withſtand it) made uſe of, there is wont to be given ſomewhat in form of a Julep, Decoction, Emulſion, juicy Expreſſion, Powder, Pills or Lohochs. We will annex certain more elegant and more efficacious Receipts of all of theſe, as likewiſe of Narcoticks, which notwithſtanding ought not every where and indifferently to be uſed, but methodically and ſeaſonably, according to advice of a diſcreet Phyſician, according to the various conſtitution of the patient and condition of the diſeaſe.

The forms of Medicines.

1. Juleps *and* Diſtilled Waters.

Juleps.

Take of Purſlain and Poppy-water of each 6 ounces, Dragons-blood in moſt fine powder half a dram, ſyrup of red Poppies two ounces, ſpirit of Vitriol of Mars ℈ß. *mix them; the doſe* ʒiij. *repeated once in 5 or 6 hours.*

Take of Plantane-water ℔j. *Gum Tragacanth and Arabick powder'd, of each* ʒß. *mingle and diſſolve them; after adding ſyrup of dryed Roſes* ʒj ß. *make a Julep; the Doſe* ʒiij. *or* ʒiiij. *every third or fourth hour.*

Take of the water of Oak-buds, red Roſes, Water-lillies, of each ʒiiij. *of Blood-ſtone finely ground, Bole-Armenick powder'd, of each* ʒß. *ſyrup of Water-lillies* ʒij. *mix them; the doſe* ʒiij. *or* ʒiiij. *three or four times a day.*

Diſtilled Waters.

Take of the Dew or almoſt inſipid Phlegm of Vitriol ℔j. *Syr. of Myrtles* ʒij. *mix them, the doſe* ʒij. *or* ʒiij. *often in the day or in the night.*

Take of Cypreſs-tops M. viij. of the leaves or flowers of Willow M. vj. *the greater Comfry-roots, Water-lillies, of each* ℔ß. *Pomegranate-flowers* M. ij. *All being cut ſmall together, pour on them* ℔ viij. *of new Milk; let it be diſtill'd in common Organs, the doſe* ʒiij. *or iiij, often in a day.*

Take of this diſtill'd Water, and of Plantane-water, of each ℔ß. *Gumm Tragacanth and Arabick of each* ʒij. *diſſolve them; the doſe is* ʒiij. *every third hour.*

The following Mixture is preſcribed by Dr. *Frederick Decker*, to be taken a ſpoonfull at a time in ſpitting blood, and ſeems a very beneficial one.

Take of Plantane-water ʒij. *Cinnamon-water* ʒij. *conf. of Hyacinth* ʒi ß. *diſtill'd Vinegar* ʒß. *of red Coral prepar'd* ʒß. *Balauſtins, Dragons-blood, of each* ℈ß. *Laudanum Opiate gr. iij. Syr. of Myrtles* ʒj. *mingle them.*

A Julep.

Take of Plantane, red Roſe, and Purſlain-water, of each ʒiiij. *of Blood-ſtone and Dragons blood reduced into fine-powder, of each half a dram, Sugar-Candy* ʒ vj. *make a Julep.*

A Solution of common Vitriol, or of Vitriol of Mars made in Spring-water, and applyed with a rag to a wound, wonderfully ſtops bleeding, but is ſcarcely convenient to be given inwardly.

2. Decoctions, Tinctures, *and* Emulſions.

Apozems.

Take the leaves of Blood-wort, Periwincle, Mouſe-ear, Plantane, Wood-ſorrel, both ſorts of Daiſies, of each one handfull, red Roſe leaves half a handfull, Barly half an ounce, Raiſins two ounces, boyl them in three pints of Smith-forge water filtred, (or water wherein hot Iron hath been often quencht) to two pints. To the ſtrain'd liquor add

add two ounces of the ſyrup of the Juice of St. John's-wort, *or of Mouſe-ear, make an Apozeme, doſe from four ounces to ſix, three times in a day.*

Take the leaves of St. John's *Wort, roots and leaves of Tormentil, of the greater Burnet, Meadow-ſweet, of each one handfull, of the ſeeds of Purſtain, Plantane, Sorrel, of each one dram,* Conſerve *of red Roſes half a pound, Spring-water eight pound, boyl them for* 12 *hours in* Balneo Mariæ, *to it being ſtrained adde half a ſcruple of the ſpirit of Vitriol of Mars, to be taken as the former.*

Take of Barly-water with Madder-roots boyled in it a pound and half, infuſe in it being warm a handfull of red Roſe-leaves, adding one ſcruple of ſpirit of Vitriol, after three hours ſtrain it, adding Syrup of the Juice of St. John's *wort one ounce and half, take three or four ounces, three or four times a day.* Tinctures.

Take of the decoction of the roots of freſh Nettles a pound and a half, white Poppy and Henbane-ſeeds of each two drams, Melon-ſeeds 6 *drams, make an Emulſion, ſweeten it with Sugar penids; the doſe is three ounces, three or four times in a day.* Emulſions.

3. Juices of Herbs and juicy Expreſſions.

Take of the Juice of Plantane half a pound, take two or three drams three times a day, in 3 *ounces of the diſtilled water preſcribed before; ſweeten it to pleaſe.* Juyces of Herbs.

Take of freſh Nettles, Plantane, the ſmaller Daiſies, of each 3 *handfulls, bruiſe them, and pour upon them of Purſlain-water* 6 *drams, make an expreſſion, take it as the former.*

4. Powders *and* Pills.

Take of the powder of Blood-ſtone, Dragons-blood, ground with Roſe-water on a Marble, Pearles, of each one dram, Bole Armenick, and Earth of Lemnos, *of each half a dram, Troches of Winter-cherries two drams, make a powder, divide it into twelve parts, one part to be taken three times a day in the former diſtill'd water.* Powders.

Take of Henbane, white Poppy-ſeeds, of each 10 *drams, ſealed Earth, red* Coral, *of each* 5 *drams, Sugar of Roſes three ounces, make a powder, the doſe one dram morning and evening; this compoſition made up with a fit Syrup into a ſoft conſiſtence, was anciently call'd and renowned in* Germany, *by the name of* Helidæus *Electuary.*

The aforeſaid Powders with the addition of Gum Tragacanth diſſolv'd, or ſome fit ſyrup, may be reduced into Pills or Lozenges. Pills.

The ſpongious excreſcence uſually growing to the fruit of Hipps or Dog-bryar, reduced into powder, half a dram taken twice a day, is a very profitable remedy in ſpitting blood.

Take of Yarrow bruiſed and dryed in the Summer-Sun as much as you pleaſe, reduce it into powder to be kept in a Glaſs; the doſe from half a dram, to a dram twice a day in any convenient liquor.

Julius Cæſar Scaliger's *Powder, or rather that of* Serapion *is mightily commended. Doſe four drams, twice or thrice a day.*

5. Lohochs *and* Electuaries.

Take conſerve of red Roſes, of Dog-roſe, of each two ounces, powder of white Poppy and Henbane ſeeds, of each two drams, ſpecies Diatragacanth. frig. one dram and half, of Blood-ſtone, Dragons-blood prepared, of each half a dram, Syrup of red Poppyes what will ſuffice to make an Electuary. Take the quantity of a Cheſnut evening and morning, at other times let him lick with a liquoriſh ſtick. Electuaries.

Take conſerve of the greater Comfry *flowers, of Water-lillies, of each an ounce and half, Troches of Winter-cherries, of Diatragacanth. frig. of each a dram and a half, ſyrup of Jujubes what will ſuffice to make a ſoft Electuary, of which lick often.* Lohochs.

Take of the white of an Egge well beaten two drams, Sugar of Roſes one dram, of white Starch three drams, make a Lohoch *to be taken often with a ſpoon.*

Take of Conſerve of red Roſes 3 *ounces,* Leucatella's *Balſam half an ounce, Troches of Winter-cherries two drams, Syrup of red Poppies what ſuffices to make a ſoft* Lohoch: *the doſe is the quantity of a Cheſnut night and morning.*

The second Indication.

II. The second preservatory Indication exhibits such remedies, which by containing the blood in its right temper, and the Lungs in their due frame, do provide against a relapse of spitting blood, and the following of a Phthisis. Such things which respect the blood, either are mild evacuators by Stool, Urine or Sweat; or are meerly Alteratives. Every of these are usually prescrib'd either in form of Potion, Powder, Electuary, or Pills: We will here shew you the most select patterns of the chief of them.

The first intention in respect of the blood.

A Purge.

1. As to Evacuators, a gentle Purgative is sometimes appointed after this manner.

Take of the best Senna three drams, Cassia fistula bruised one ounce, Tamarinds three drams, Coriander-seeds a dram and a half, boyl them in Spring-water to 6 ounces, to it strain'd add syrup of Chichory with Rhubarb one ounce, clarifie it with the white of an Egge. Or,

Take 4 ounces of Gereons *decoction of Senna, Syrup of Apples purging one ounce, mingle them and make a potion.*

Alteratives.

2. That the good temper of the blood may be preserved, and the superfluities drained from the Lungs may be continually discharged by Sweat and Urine, these following Alteratives, or some of them are for the most part receiv'd in constant use; which also being endued with a healing power, do succour the weak Lungs, or those whose Unity is dissolv'd.

For ordinary drink, let simple water, especially in a hot constitution, or being colour'd with a little Claret-wine, be drunk. Those with whom this doth not agree, *a Bochet of China, Sarsa, with shavings of Ivory, Harts-horn, with white Sanders, or small Beer, or small Ale, with the leaves of Harts-tongue, Oak of Jerusalem,* and the like infused, are frequently used with good success.

Pectoral Decoctions or Hydromels with temperate Vulneraries are taken twice or thrice a day to 6 or 7 ounces.

Decoctions.

Take of fresh Nettles, Chervil, of each one ounce, Harts-tongue, Speedwell, Mouse-ear, Ground-Ivy, St. Johns-*wort, of each a hand-full, boyl them in three pints of Spring-water, to two pints, adding Raisins stoned an ounce and half, Liquorish two drams, to it strain'd add Syrup Byzantine two ounces, clarifie it with the white of an Egge, make an Apozeme to be taken from 4 ounces to 6, twice or thrice in a day for a month. In a more cold or phlegmatick constitution, let the Liquorish and Raisins with the Syrup be omitted, adde at last of Hony well clarified two ounces, strain it and keep it for use. The Dose is the same.*

The use of these is sometimes intermingled with a distilled water appropriate for that use, which likewise is more frequently taken by such who nauseate and loathe Apozemes.

A distilled water.

Take the tops of Cypresse, leaves of Ground-Ivy, of each 6 handfulls, of Snails half boyled one pound and half, of all the Sanders bruised of each one ounce, being cut and bruised infuse them in 8 pound of fresh Milk, distill it in common Organs, the Dose 3 or 4 ounces with a spoonfull of Syrup of Ground-Ivy, to be taken twice in a day.

The second intention respects the Lungs.

2. In respect of the Lungs, *viz.* that without obstruction or opening of the vessels, the Union of parts, and due conformation of the whole may be preserved, temperate balsamicks chiefly conduce. To this intent *Leucatello's* Balsam is commonly prescribed to be taken daily and for a long season. Chymists and certain Noble women do cry up with great praise a balsamick Oyl drawn by distillation, called by them *the Mother of Balsam.*

It would be easie here to reckon up very many other remedies against spitting blood, very much celebrated by the ancient as well as by modern Writers; notwithstanding the harvest of these already gathered together doth at present seem rich enough. But it remains, that I illustrate as well the Theory of this disease, as the curatory method above delivered, by a History or two of sick Patients.

The first History.

A noble young man, when after a scorbutical *Cachexia* he was affected with a Palsie, and for curing this disease, remedies not only great but improportionate to the blood and spirits were experimented by him, *viz.* Salivation and the use of Baths, he

he contracted a ſpitting of blood, whoſe fits (of all I ever knew not preſently mortal) were moſt fierce. Preſently on the firſt appearance of this diſeaſe, ſpitting blood followed the Operation of *Hues*'s powder (from which having for ſome time ſuffered a flowing of the Mouth, without his Palſie being cured he was reduced to great weakneſs:) Then being afflicted with a Catarrh, and a Cough very troubleſome, he began to diſcharge a diſcolour'd Spittle, ſometimes ſtained, and ſometimes ſprinkled with blood; but this diſeaſe being mild from the beginning, did ſuddenly vaniſh away by the uſe of remedies, and after going into the Countrey, and ſucking in a more pure air, he became better, and after a while ſeeming healthful enough in his breaſt, he went to the Bath, for the benefit of his Palſie; where daily bathing for a fortnight in thoſe hot waters, he again contracted a Cough, and a little after an horrid Hæmoptoe or a ſpitting of blood, ſo that in the ſpace of 24 hours, coughing often and plentifully, he poured out blood in a vaſt quantity.

I firſt viſiting him in this condition, proviſion being made for the whole, I preſcribed preſently Phlebotomy for revulſions ſake: notwithſtanding after this adminiſtration (both then and ever after) he either repeated the bloody ſpittle, or grew worſe. Moreover, I exhibited Juleps, Lohochs, Decoctions, and alſo Hypnoticks, which helping little or nothing, ligatures made about his arms and thighs, did firſt of all reſtrain the tyranny of this diſeaſe: And when afterwards the Evil broke out again, I perſwaded him at length, (his drink of Beer being left) that he ſhould conſtantly drink the decoction of China and Sarſa with the Pectorals. By the continual uſe hereof, obſerving moreover an exact courſe of diet, and altogether abſtaining from wine, more hot aliments, and Salt, and Sugar, for above two years he was well in health.

But afterwards when by being crouded in a Court of Judicature, he grew mighty hot, he relapſed back again into a terrible ſpitting of blood. A Phyſitian being ſent for, he was preſently let blood in the arm, whence his ſpitting of blood became more ſharp; and when afterwards letting blood was repeated the ſecond and third day, and the evil grew worſe every time, at length Ligatures (as at firſt) being adminiſtred, and the pectoral drink and a Linctus being often taken, the diſeaſe preſently remitted, and in a ſhort ſpace wholly ceaſed; notwithſtanding he continued the uſe of his pectoral decoction and ſlender diet, *viz.* no fleſh-meat, for a fortnight; and from thence he obtained truce from his enemy for three years; and when afterwards at any time the blood ſwelling by drinking of wine, or taking more dainty food, began to break out from the Lungs, preſently by ligatures, and the uſe of the Decoction and Lohoch, and a thin diet, its aſſault was wont to be repulſed. But he did not ſo ſafely eſcape, but that it was neceſſary for him for the moſt part to keep perpetual watch againſt that enemy always lurking: for not long ſince by reaſon of the intemperature of the year, he contracted a troubleſom Catarrh, with a Cough, a plentifull ſpittle, and ſometimes bloody, and then the former medicines effected leſs; wherefore, he betook himſelf by his own advice to new things, and in the firſt place took evening and morning a ſpoonfull of Syrup of Ground-Ivy, and thereby enſued a notable help: but when that Syrup became quickly loathſome by reaſon of the Sugar, he took the powder of that herb well prepared to half a dram, or one dram twice a day in a ſpoonfull of ſome liquor; by the long uſe of which Medicine he was much better as to his Catarrh and Cough. But when the ſpitting of blood now and then broke out, though in little quantity, he chang'd again his Medicine, and took twice in a day the powder of the tops, and chiefly of the hairy excreſcences of Cynorrhodon or Dog-bryer: which only medicine a certain Phyſician renowned formerly for the cure of ſpitting blood, uſed with great ſucceſs. Neither did our Patient receive a leſs happy effect from that medicine, for preſently after he eſcaped altogether free from a Cough, a Catarrh and bloody Spittle, and ſo remained for a long while: untill at length believing this diſeaſe of the Breaſt to be wholly ſubdued, and therefore ſlighting it, he aſſumed weapons againſt the other more ancient enemy the Palſie. Wherefore, while his Hæmoptoſis or Spitting of Blood was neglected, he daily took a large doſe of hot Medicines to conquer that other diſtemper, *viz.* magiſtral waters diſtilled with Wine, ſpirit of Harts horn, of Sa't Armoniack, and Aromatick Powders and Confections; Beſides, whilſt he indulg'd himſelf in a more plentiful diet, with a moderate drinking of Ale and Wine, the roaring Lion that at firſt ſeem'd to ſleep, was again ſtirr'd up, *viz.* he had not long continued in that antiparalytical Method, but the Spitting of blood returned with its greateſt fierceneſs, ſo that in the ſpace of a day and a night he

coughed out above three pints of ſpumous blood. But afterwards a Phyſician being ſent for who preſently preſcribed Phlebotomy, the ſpitting of blood began to ceaſe upon bleeding (as formerly it was always wont to do) but then fell into ſharp fits again: which however by the uſe of Ligatures, and a Lohoch and pectoral Decoction daily taken, was preſently aſſwaged, and a while after wholly ceaſed. And when afterwards he uſed the pectoral Decoction three months, and a very ſlender Diet, *viz.* without any fleſh, only of Herbs, Barley, &c. and Milk-meats, in a ſhort time he recovered his former health, and now lives in that ſtate, ſo triumphing over that cruel diſeaſe, that many Hæmoptotic perſons conſult him as their Oracle, and for a Cure do propound a method of this kind of living to be followed before the Phyſicians advice.

The reaſon of the caſe. What is moſt wonderful in this caſe is, that after ſo many breaches ſo often happening in the Lungs, this famous Perſon was not in the intervals affected with a Cough, neither fell afterwards into a Conſumption; whereas moſt after any of the ſmalleſt veſſels being open in the *Præcordia*, for ſome time after labour with a Cough with plentiful and thick ſpittle, and at length frequently become conſumptive. And that it happened otherwiſe to our Patient, I chiefly attribute to the balſamic conſtitution of his blood, *viz.* in the maſs whereof the ſerous recrements are either leſs collected, or ſo ſtrictly mingled, that they cannot be eaſily ſeparated thence; wherefore after the veſſels were broken, or their unity diſſolved, a plentiful Ichor or ſharp humor (being wont to generate a Cough and ſpittle) did not ſweat out as in many others. Moreover what he himſelf obſerved, contrary to many others, that his ſpitting blood happened never in winter, but in Summer, came alſo ſo to paſs by the ſame reaſon: becauſe when the blood did leſs abound with vaporous recrements, the opening or obſtruction of the Pores were neither an advantage nor prejudice to it; nevertheleſs the blood growing hotter than it ought to be, ſeeing it exhaled not, there was a neceſſity it ſhould break out of the veſſels; and when again diminiſhed in quantity, ſending away little or no ſerous Ichor out of the orifices of the veſſels, the ſpitting of blood ceaſed without a remaining Cough. The ſame reaſon holds of many that ſpit blood, wherefore ſome are found much inclinable, others not prone to a Conſumption. This Gentleman ever found the uſe of the pectoral Decoction advantageous to him: wherefore when he often varied other Medicines he always retained the ſame Decoction: moreover he hath commended it to many others ſpitting blood with ſucceſs. The form of the Preſcription was this.

A Drink. *Take of all the Sanders of each ſix drams, infuſe them for twelve hours in ſeven pints of Spring-water, then boil them to a conſumption of a third part, after add leaves of Colts-foot, Maidenhair, Mouſe-ear, Speedwel, flowers of St. Johns-wort, each two handfuls; ſweet Fennel ſeeds ſix drams, Liquoriſh half an ounce, Raiſins ſtoned half a pound: boil them to four pints, afterwards ſtrain it, and keep it for ordinary drink.*

Moreover the ſpitting blood threatning and preſſing upon him he took thrice or oftener a day the quantity of a Nutmeg of the following Electuary, drinking after it ſeven ſpoonfuls of a Julep.

The Electuary. *Take conſerve of red Roſes three ounces, conſerve of Hips, Comfry, each an ounce and half; Dragons blood a dram, ſpecies of Hyacinth two ſcruples, red Coral a dram, with a ſufficient quantity of ſyrup of red Poppies, mix them and make a ſoft Electuary: let him take hereof evening and morning a dram and half, drinking after a draught of the following Julep. At other times let him lick it with a Liquoriſh-ſtick.*

The Julep. *Take Plantane and Spawn-Frog-water, each ſix drams; ſyrup of Coral, dried Roſes, each an ounce; Dragons blood two ſcruples: mix them, and make a Julep.*

Among the examples of them that ſpit blood the caſe of that Reverend perſon Dr. *Berwick* S. T. P. and lately Dean of St. *Pauls* Church ought not to be omitted, which ſome while ſince I learned partly from the Patient himſelf, and partly was communicated to me from his Brother that moſt skilful Phyſician Dr. *Berwick* my moſt dear Friend.

The ſecond Hiſtory. That moſt renowned Divine fifteen years before he died laboured with a moſt obſtinate Cough, and ſometimes with a bloody and ſalt ſpittle, with a grievous breath ſtinking like Hell; by which being made lean by a pining away of the body, he wanted but little of being almoſt extinguiſhed by a Conſumption. As often as his ſpitting blood intermitted, the rankneſs of breath and ſpittle ceaſed alſo; afterwards the return hereof declared conſtantly that other affect to be preſently attendant. In this langui-

languiſhing condition, when this Renowned man was diſcovered to favour the Kings Party at that time oppreſſed with a grievous Tyranny, and being caſt into a ſtrait Priſon; did drink meer water inſtead of ordinary drink, he recovered his health beyond the hope and expectation of all perſons, and ſo remained indifferently healthful for above ten years ſpace. Nevertheleſs afterwards, I know not by what occaſion, unleſs by the hardſhip of a cold winter, not only the aforeſaid evils, *viz.* a Cough with bloody and ſalt ſtinking ſpittle did become fierce upon him, but alſo over and above, a debility of ſtomach, want of appetite, and a nightly Feaver did accrue. But not long after theſe Symptoms a little remitting, fair weather again ſeemed to ſhine out; until on a certain day, the air being ſuddenly changed into an intenſe cold, towards night he was aſſaulted with great ſtraitneſs of breaſt and difficult breathing, with a quick and weak pulſe, and fainting of all his ſpirits, as if he had been expiring. Nevertheleſs from this danger he ſuddenly eſcaped by the interpoſition of a Criſis, *viz.* by a plentiful ſpitting of blood, and after by a breathing Sweat: but from that time his ſpittle remitted much of the uſual ſtench, and ſomething of its ſaltneſs; and when in a ſhort time afterwards the laſt and moſt painful invaſion of ſpitting blood threatned him, that uſual preſage from ſtench of breath was wanting; but the ſubſequent ſpitting of blood being very plentiful, did ſo debilitate his ſtrength, that from that time declining ſenſibly, he expired within a month: and when a little before his deceaſe, by reaſon of a ſharp pain in his ſide, a Vein was breathed, his blood ſeemed to fail ſo, that almoſt none ſtreamed out. Moreover in his body diſſected after death very little quantity of blood was found: nor could they find any footſteps of the other moſt notable Symptoms, *viz.* ſpitting of blood and of the ſtinking breath and ſpittle; for there was no collection of any filth or ſtinking and putrid matter, nor any cavity in the Lungs made by an Ulcer or Wound; but only one lobe of this bowel, or rather the whole left ſide was ſo hardned from a ſcirrhous Tumor, that the blood could not eaſily or but very little paſs through the frame being ſo obſtructed, and as it were ſtony: wherefore it is no marvel, if the blood that ſhould have paſſed moſt ſwiftly through the Lungs, did now and then burſt out in ſome place from the veſſels, which were joined together, or ſuffered not a circulation by reaſon of the Schirroſity.

The reaſons of the caſe.

Notwithſtanding here a greater difficulty ariſeth, *viz.* whereas his Lungs were found altogether free from any Ulcer or notable wound, whence that moſt dire ſtench of ſpittle and breath, always a forerunner and companion of the bloody ſpittle (the laſt invaſion of this diſeaſe only excepted) proceeded. We have in another place given remarks upon all theſe things, as that Ulcers of the Lungs and the purulent ſpittle of conſumptive perſons ſeldom or never ſtink, but the matter caſt out of an Impoſthume of the Lungs doth frequently ſtink: but that in the ſick Doctor the Lungs being free from either affect, breathed out ſo horrible a breath, the reaſon will beſt of all appear, if we inquire of the manner and cauſe of a ſtench in general. For we obſerve this to be excited when the impure Sulphur is diſſolved either by a lixivial, or an acid Salt, and is precipitated by the other. Let common Sulphur, or Sulphur of Antimony be diſſolved by Oil of Tartar or Stygian water; afterwards if you pour on this ſolution a diſſolution of fixed Salt, and upon that, Vinegar, a moſt hideous ſtench will ariſe. In like manner we may conceive in the caſe propoſed, that the ſulphureous particles of the blood being very impure, were corroded by the fixt Salt, with which its juice abounded very much; afterwards when the acid humor, having endured a flux, reflows from the nervous parts into the maſs of blood, it precipitates the diſſolved Sulphur, and ſo cauſes that ſtench to be exhaled from the Lungs, and whilſt it forces the blood into a turgency, a little after it compels to a ſpitting of blood. I have known ſome endued with a breaſt firm enough, and free from all Coughs and conſumptive diſpoſition, who have for the moſt part breathed out a moſt hideous ſtench: which could proceed from no other cauſe, beſides what even now we have obſerved. The impure blood abounding with Sulphur diſſolved with Salts, if perhaps while it is rarified within the Lungs, and looſned in its frame, it meets with an acid humor, it will exhale in breathing putrid and horrid effluvia's. It happens by the like reaſon of the blood otherwiſe diſpoſed, that as the breath of ſome perſons is very ſtinking, ſo of others very ſweet. And indeed the breath or air reciprocated through Reſpiration, for that it carries out with it the effluvia's of blood highly rarified within the *Præcordia*, one while diſperſes a grateful vapor, another while a moſt unpleaſant.

SECT. I. CHAP. VIII.

Of a Peripneumony, or Inflammation of the Lungs.

The deſcription of a Peripneumony.

A Peripneumony is uſually defined to be, an inflammation of the Lungs with an acute Feaver, a Cough, and difficult breathing. They who labour with this diſtemper are greatly ſenſible of a notable inflammation in their breaſt with a ſwelling of the Lungs, and ſometimes a pricking pain, they draw a painful and ſhort breath, or, as *Hippocrates* affirms, a deep breath; the Feaver preſſes with great thirſt, watching, and painful Cough; whereto alſo bloody ſpittle, or ſtreakt with blood, ſucceeds. By which Symptoms it clearly appears, that this diſeaſe ariſes, in as much as the blood boiling feaveriſhly, doth not eaſily paſs through the leſſer pneumonic Veſſels; but ſticking in their paſſages, begets firſt an obſtruction, afterwards being more heaped and extravaſated, propagates a Phlegmon or inflammation with heat, a Cough, and diſcoloured ſpittle. Moreover in as much as the blood ſo accumulated and ſtagnating, puffs up theſe paſſages of the Lungs, and compreſſes them, a difficulty of breathing is cauſed; and in as much as it pulls or diſtends the nervous Fibres, a pain frequently ariſes.

After what manner a Phlegmon is bred in the Lungs.

But if it be asked, how a Phlegmon ſhould grow together in the frame of a Lung meerly bladdery and excarnous; and after what manner it is diſtinguiſhed from that diſtemper which is wont to be ſtirred up in muſculous fleſh, or the ſubſtance of a bowel? We muſt anſwer, although the above-mentioned parts vary as to the texture, notwithſtanding the reaſon of the affect is altogether the ſame in each of them. For the ſmall ſanguiferous veſſels do every where alike embrace, bind, and variouſly gird about both all the Tracheal paſſages in the Lungs, and alſo the fleſhy fibres in the Muſcles, and laſtly the little fibres and nervous threds, with the thickeſt foldings like cluſters, of the Parenchyma. But that which produces a Phlegmon is the blood it ſelf, which, while it grows very hot, and is hindred in its paſſage, every where, and eſpecially in the Lungs, whoſe veſſels branch into very ſmall foldings, doth firſt beget an obſtruction, and then an inflammation.

The conjunct cauſe of a Peripneumony conſiſts in two things.
1. *That the blood boils.*
2. *That it ſticks in the paſſages.*
Sometimes this diſpoſition, ſometimes that is firſt.

Wherefore the formal reaſon and conjunct cauſe of a Peripneumony conſiſts in theſe two things, *viz.* that the blood boils feaveriſhly, and ſticking alſo within the more narrow paſſages of the Lungs, engenders there an obſtruction cauſing inflammation. Unleſs theſe two things concur, there is an exemption from this diſeaſe; for in many other Feavers, eſpecially in a burning Ague, though the blood, moſt intenſly heated and inflaming all the *Præcordia*, as alſo in the longing of women, the Green-ſickneſs and the Dropſie of the breaſt, is very clammy, yet though ſticking very much in the paſſages of the Lungs, it does not ſtir up a Peripneumony: to produce which both diſtempers muſt concur and join their ſtrength. Nevertheleſs when there is an indiſpoſition of both theſe, one while this, another while that, is firſt in act, and after a ſort one is the cauſe, or at leaſt the occaſion of the other. For ſometimes the blood irritated into a Feaver cauſes an obſtruction of the Lungs; and the blood alſo ſometimes finding a remora in the Lungs, receives a feaveriſh boiling from its proper obſtruction. Notwithſtanding, for the conſtituting the procatarctic cauſe of this diſeaſe, the blood ought to be fitted as well for the boiling, as for the obſtructing the veſſels of the Lungs.

What that is Phlebotomy diſcovers.

Though it will not be eaſie to ſhew what this diſpoſition of the bloody liquor is inclining to a Peripneumony, yet the reaſon thereof doth ſomething appear by Phlebotomy, always made uſe of in this diſeaſe with the beſt ſucceſs. For the blood being drawn from any labouring with this diſeaſe, as alſo from thoſe in a Pleuriſie, after it grows cold, in its ſuperficies inſtead of a Scarlet cream, it hath a little film ſomewhat white or otherwiſe diſcoloured growing on it, which alſo is very tough and viſcous: whence we may conjecture, that the maſs of blood being too ſtrait in its frame, whilſt that in the circulation it doth not diſcharge its recrements, grows too thick, and as it were clammy, and for that cauſe becomes too prone as well to boil as to ſtick within the narrow paſſages, and eſpecially of the Lungs.

What affection of the blood produces it.

But if farther inquiſition be made, from whence this diſpoſition of blood proceeds, by which it becomes clammy and viſcous like ropy wine; the general reaſon hereof is this, *viz.* that the more thick parts of blood are not made thin enough by the more ſubtile; ſo that all of them being equally mixed and mutually incorporated, at length the

good

good humors ſeparate themſelves into their appropriate functions, and the ſuperfluous are perpetually diſcharged by their proper Emunctories. But on the other ſide in as much as the ſulphureous particles of the blood being combined together with the ſaline and earthy too much exalted, enſnare and entangle all the reſt; for that cauſe its liquor containing within it ſelf all its recrements and impurities, grows clammy as glue, and in that regard contracts an inflammable diſpoſition.

For it is obvious to every perſon, that the blood that grows clammy in this manner, is rendred prone to obſtruct the narrow paſſages of the veſſels (which ſurely are very ſmall in the Lungs); moreover for the ſame reaſon they are diſpoſed to become feaveriſh: *viz.* becauſe retaining obſtinately within its own boſom all the feculencies and recrements, from the ſame preſently gathered into a heap, it is conſtrained into a great turgeſcence or ſwelling, whereby of neceſſity an inflaming obſtruction of the Lungs takes either its origine or augmentation.

The fault of the Lungs produces it.

Moreover as to the procatarctic cauſe of this diſeaſe, very frequently the faultineſs of the Lungs is joined herewith, and determines that general intemperament of blood to affect this part in ſuch a ſort. For as the clammy blood grows hot, the more ſtrong and ſound *Præcordia* do frequently diſcharge the deſigned miſchief from themſelves, and the taint being fixed to the Pleura, or about the habit of the body, a Pleuriſie or Rheumatiſm is rather cauſed than a Peripneumony. Nevertheleſs the tender Lungs being obnoxious to a Cough, or formerly prejudiced in their frame either by ſpitting blood, or other diſtempers of the breaſt, from the blood boiling up (while it is too much bound and clammy in its own conſiſtence) they eaſily engender an obſtructing Phlegmon.

The evident cauſes of a Peripneumony.

Hitherto of the conjunct and procatarctic cauſes of a Peripneumony: as for what regards the evident cauſes, whatſoever ſuddenly perverts the temperament of the blood, or reſtrains its free tranſpiration ought to be referred hither, as chiefly are exceſſes of heat and cold, or the inordinate drinking of Wine or ſtrong Waters, any vehement exerciſe, and the drinking of ſome waters, and thoſe eſpecially icy. Beſides, ſometimes a malignant diſtemperature of Air doth engender this diſeaſe in many, and makes it Epidemical.

It often ſucceeds or follows after a Pleuriſie.

Authors in Phyſick do every where obſerve (and it is alſo a vulgar obſervation) a Peripneumony frequently ſucceeds or comes upon a Pleuriſie; but nothing is more uſual than in a Pleuriſie a bloody and thick ſpittle, and as it were purulent to be voided. Hence a great diſquiſition ariſes, by what paſſage or ways the matter by ſpittle caſt out, can be conveyed from the Pleura to the Tracheal paſſages. Some think, that this being fallen into the cavity of *Thorax*, is ſucked into the Lungs as with a Sponge; and others ſuppoſe, that it is transferred thither by the Membranes adhering thereto, by which the Lungs often ſtick unto the Pleura. But truly either way ſeems improbable, if not impoſſible. For firſt, that the Lungs do not ſuck in the contents of the hollowneſs of the Cheſt is manifeſt from hence, becauſe in a Dropſie or wound of the breaſt, when they happen, the Lungs being unhurt, neither water nor blood is at all diſcharged by coughing; though frequently great plenty of this or that humor be there, which preſently flows out of its own accord from the *Thorax*, inciſion being made. But that ſometimes the Membranes growing from the Lungs, knit themſelves to the Pleura, is clearly manifeſt by Anatomical obſervation; yea and by this way of return I have ſometimes known the purulent matter tranſlated into the ſide, and there by an Iſſue, made by Art or Nature, to have been evacuated with a heathful Criſis: nevertheleſs ſuch Membranes of the Lungs joined to the Pleura do ſeldom pre-exiſt, and in a Pleuriſie, which is a very acute diſeaſe, they cannot, like a Muſhroom, be the iſſue of one or two days: moreover, though ſometimes thoſe obſcure paſſages may be ready at hand, which perhaps by ſome admirable inſtinct of Nature diſcharge ſomething out of the Lungs towards the precincts of the *Thorax*; yet it ſeems againſt the Oeconomy of Nature, that they can derive any corruption outwardly engendered to this moſt noble part within, which ſurely is the fountain both of life and heat.

The reaſon of this is inquired into.

As to this, if it may be lawful to propound our Judgment, I am induced to think that a Peripneumony and Pleuriſie are one while ſingular and ſeparate affects, and another while bred together and coexiſting from the firſt, and another while are by courſe one after another or ſuccedaneous. For the procuring cauſe being ſtirred up into act, ſo that the blood growing clammy, and boiling together, obſtructs in ſome places the leſſer veſſels: the neſt of the diſeaſe ſometimes is faſtned on the Pleura, or ſeparately in the Lungs, ſometimes in each of them together, and ſometimes firſt in one, and then in t'other: but for the moſt part, the Pleura being firſt healed, preſently the

ſame morbific cauſe invades alſo the pneumonic Veſſels. Moreover we have known a various ſhifting of this affect; *viz.* that it has firſt troubled the right or left ſide, preſently that being deſerted, to have occupied the Lungs, and afterwards both being deſerted, to affect the Brain, and frequently to transfer its ſeat from thence into the above-mentioned places. But for the reaſon aforeſaid a Peripneumony not only ſucceeds a Pleuriſie, but frequently a Squinancy, and ſometimes other diſtempers: for while the blood growing clammy, and boiling together, continues a Feaver in the whole, it transfers the obſtruction cauſing a Phlegmon variouſly hither and thither. And from hence the ſolution of that obſervation is clearly manifeſt, which has ſo much puzled Interpreters, *viz.* that a Palſie or dead Palſie of one ſide doth ſometimes ſucceed a Peripneumony, becauſe the blood that being clammy, had lately obſtructed the pneumonic Veſſels, afterwards ſtuffing certain foldings of the veſſels of the Carotides, prohibits the engendring of animal ſpirits in this or that part of the head, and ſo reſtrains their influence into the reſpective nervous parts. From what hath been ſaid, the chief differences of a Peripneumony are made plain, namely that it is either a ſimple diſtemper, or joined together with a Pleuriſie, Squinancy, or ſome other, and then it is either primary or ſecondary. Moreover it is uſually diſtinguiſhed as to the Feaver and ſtate of breathing: to wit, according as this is more or leſs prejudiced, and as it ſhall be more intenſe or remiſs, this diſeaſe alſo is denominated either more or leſs acute.

The differences of this diſeaſe.

Prognoſtics.

As to the Prognoſtics of this diſeaſe, common experience doth atteſt, that it is a very dangerous diſeaſe, becauſe many Patients either die of it, or very difficultly recover health. No leſs may we conclude this from the reaſon or Etiology of it; for a wound with much extravaſation of blood, or a ſtagnation cauſed in the Lungs, is moſt difficultly cured, and the affected place is never reſtored unto its former conformation. The prognoſtic ſigns, which are of greateſt note, are taken from the appearance of Symptoms and nature of things thrown out, and the ſtate of ſtrength.

1. From the appearance of Symptoms.

1. A Peripneumony coming upon a Pleuriſie or Quinzy, for the moſt part is worſe than ariſing of it ſelf, or ſucceeding either of them: but if upon this diſeaſe, after what manner ſoever begun, an acute Feaver follows with great thirſt, watchings, and not breathing unleſs ſet upright, it is ill; and yet much worſe, if upon it a Delirium, a Frenzy, convulſive motions, or a Palſie on one ſide enſue. Moreover the Patient is not in leſs danger, if he be very purſie, if troubled with vomiting, or frequent ſwounding away, a weak Pulſe, and a cold Sweat. For while theſe Symptoms are inſtant upon him, the obſtruction of the blood in the Lungs is not removed, nothing is digeſted or ejected by ſpittle; but the circulation of the blood being more and more hindred, and its kindling by breathing ſtopt, the animal ſpirits are throughly diſordered, and at length faint, until together with a proſtration of the whole ſtrength the vital flame is extinguiſhed.

2. From what is excreted.

2. As to Prognoſtics from things excerned, we obſerve a Peripneumony to be dangerous, wherein nothing is thrown out by ſpittle; next to this, when the ſpittle is thin and crude, mixed with blood; it is far better when the ſpitting is yellow and thick, ſtreaked with a little blood. The Urine being yellow from the beginning, and of a good conſiſtency, with a cloud in the midſt, ſhews that almoſt all the recrements of the blood are lodged in the place affected; when from that ſtate it is changed into a thick and turbid Urine, it ſhews the morbific matter to be ſwallowed up again from that part into the blood; but if ſuch kind of Urine be ſuddenly changed into a thin one, then a Delirium or death it ſelf is impendent. Much Sweat and plenty of Urine, a Diarrhœa, bleeding at Noſe, flowing of the Menſtrua's, or the Hæmorrhoids do frequently promiſe good in this diſtemper, yea any of theſe Evacuations happening ſeaſonably doth frequently diſcharge the diſeaſe.

3. From the ſtate of ſtrength.

3. The condition of ſtrength is ever of great moment in forming a due Prognoſtic in this diſeaſe: for oftentimes when horrid Symptoms, as an intenſe Feaver, a Breathing very painful, with a Cough, watchings, and other ominous ſigns, ſhall be preſſing, if the Pulſe be as yet ſtrong, and the animal ſpirits perſiſt in their vigor, there is better hope of the Patient, than if theſe things being more quiet, there were a weak Pulſe, and the Spirits ſhould become drowſie and oppreſſed.

The Cure hath two chief indications.

The firſt indication about the curatory Method in a Peripneumony is, that the blood being impacted in the pneumonic Veſſels, and cauſing a phlegmonous obſtruction, may be from thence diſcuſſed and reſtored to its priſtine circulation. Which if not to be procured, the ſecond indication will be, that that matter be duly digeſted or brought

to

to ſuppuration, and with all expedition voided by ſpittle.

While the former indication prevails, the intentions of healing will be theſe enſuing. First, that the more plentiful afflux of blood to the part affected be prevented, or prohibited by ſome means. Secondly, we muſt endeavour, that the matter ſtagnated or extravaſated in the Lungs, be ſwallowed again by the Veins into the reſt of the maſs, and cauſed to circulate. Which that it may be the better procured, thirdly, the blood ought to be freed from its clammy viſcouſneſs, whereby its fluidity is impeded; Fourthly, that we apply to the Symptoms moſt urgent, *viz.* a Feaver, Cough, Watchings, and difficult Breathing, fit Remedies. But if notwithſtanding all theſe another indication ſhall come into uſe, it will be requiſite to preſcribe maturating and expectorating Medicines vulgarly ſo called, together with theſe.

The firſt indication ſuggeſts four intentions of curing.

1. That we may ſatisfie the firſt and ſecond intention together, Phlebotomy is for the moſt part requiſite in every Peripneumony, yea ſometimes it ought to be more frequently repeated; for the veſſels being emptied of blood do not only withdraw the nouriſhment of the diſeaſe, but do alſo ſup up the matter impacted in the place affected. Wherefore if ſtrength remain, and the Pulſe be ſtrong enough, a more free breathing of a Vein is convenient at the very beginning; but otherwiſe let it be uſed in a little quantity, which however may be repeated as occaſion offers it ſelf. We intimated above, that blood drawn in a Peripneumony and alſo in a Pleuriſie, after it is cold, contains in its ſuperficies a ſmall viſcous and diſcoloured film: moreover we may obſerve one while the blood entirely, another while only a portion thereof is ſubject to this change. For when the blood is received into three or four diſhes, ſometimes in all, but oftener in the ſecond and third diſh it is apparently bad, and in the firſt and laſt laudable enough: wherefore they commonly give it in precept, that blood is always ſo long to be emitted, till that which is ſo depraved begins to come forth; and if ſtrength remain, the bleeding ſhould continue till the good blood flows out again. Truly as common experience doth approve of this practice, even ſo doth reaſon it ſelf; for in this diſeaſe, becauſe the whole maſs of blood doth not preſently acquire that clammineſs, the depraved portions are chiefly accumulated about the place of obſtruction, and adhere on every ſide in the leſſer veſſels. Wherefore the blood firſt iſſuing by Phlebotomy is often void of any fault; afterwards the veſſels being emptied receive the other morbific matter at firſt ſtagnated, and reſtore it to its circulation; and when the portions thereof being placed near, are carried as it were in a joint troop, they flow out together at the orifice of the opened Vein, and after that entire maſs of bad blood hath flowed out, the reſidue being more pure doth ſucceed. Wherefore in this caſe ever let inciſion be made with a large orifice, and let the blood be drawn out not only with a more plentiful ſpouting, but alſo with a continued: for otherwiſe if in the midſt of Phlebotomy, the bad blood iſſuing out, the orifice (as the manner of ſome is, leſt the ſpirits ſhould faint) be cloſed with the finger, when again it is opened, the blood pure enough will iſſue next, but the bad ſliding by, if there be any remaining, will not return preſently to that orifice. Beſides Phlebotomy many other remedies, *viz.* whatſoever do repreſs the turgency of blood, and empty the paſſages thereof, whereby the morbific matter may be ſuckt up, are here to be uſed. Wherefore a very thin diet is preſcribed for the moſt part meerly of Barley and Oats: and if Cathartics are altogether prohibited, becauſe they diſquiet the blood, and hurry it more impetuouſly into the part affected; notwithſtanding Clyſters which gently looſen the Belly, and draw the recrements of the blood towards the Belly, ought to be daily uſed. Moreover Juleps and temperating Apozemes which bridle the fervor of the blood, and draw out the ſuperfluous ſeroſities thereof, and which alſo do gently open the paſſages of the Breaſt, are taken with ſucceſs.

1. *The firſt intention that the afflux of blood may be cut off.*
2. *That the extravaſated be reduced to circulation.*

Rules concerning Phlebotomy.

3. The third intention of healing, which reſpects the withdrawing of the clammineſs or obſtructing viſcoſity of the blood, is altogether to be performed by remedies which unlooſe the frame thereof being too much bound, and diſſolve the coupling together of its ſalts. And truly the remedies of this kind, which in this reſpect reaſon and analogy would dictate, are now received into uſe by long experience. For Powders of Shell-fiſh, the Tooth of a Boar, and the Jaws of a Pike, and other things endued with an Alkali Salt, alſo Sal Prunellæ, for the moſt part are preſcribed by all Practitioners, as well modern as ancient. I have more frequently known the Spirit of Salt Armoniac and of Harts-horn to have yielded notable relief in this diſeaſe: and for the ſame reaſon it is, (*viz.* becauſe the volatile Salt is uſeful) that the infuſion of Horſe-dung, though a common remedy, affords oftentimes ſingular help.

The third intention of healing is that the clammineſs or viſcoſity of the blood may be taken away.

4. As

4. That the most urging Symptoms may be helpt.

4. As to the Symptoms and their Cure, very many remedies appropriated to these fall in together with the former; for against the Feaver the same Juleps and Apozems which appease the heat of blood, and withal recreate the animal spirits are of most common use: to which besides in respect of the Cough and difficult breathing, temperate pectoral Remedies are added. The great difficulty is what ought to be exhibited against want of sleep, when it shall grievously oppress; for Opiates, because they do further prejudice the breathing, which in this disease is already hindred, are scarce safely administred, nay sometimes become mortal. Wherefore Laudanum and the strong Preparations of Opium are to be shun'd in a Peripneumony worse than a Dog or a Snake; nevertheless Anodynes sometimes, and mild Hypnotics, as water and Syrup of red Poppies, are not only allowed, but accounted specific remedies in this disease and in a Pleurisie: but sometimes it will be expedient to use Diacodiates as long as strength endures, and as long as the Pulse is strong and good enough. For the pain of the breast, if at any time it be troublesom, it is expedient sometimes to apply Liniments, Fomentations, and Cataplasms.

The second indication respects the maturation and expectoration of the morbific matter.

The second curative indication, whose intentions are to digest the matter impacted in the Lungs (if it cannot be discussed or suckt up) and to throw it out by spittle, requires ordinary maturating and expectorating Medicines, both which notwithstanding ought to be temperate, that is to say, such as asswage thirst, and appease the feaverish heat rather than exasperate it. We have above recited in the Chapter of a Cough, the kinds of these sorts of Remedies properly called Pectorals; the more select Receipts, and chiefly accommodated to this affect, shall be annexed here beneath.

The Forms of Remedies.

1, 2. The Medicines conducing to the first and second intention are prescribed according to the following Forms.

Juleps.

Take the water of Carduus Mariæ ten ounces, red Poppies three ounces, Syrup of the same an ounce, Pearls prepared a dram, make a Julep: the dose six spoonfuls every fourth hour.

Take water of black Cherries, Carduus benedictus, Balm, each four ounces; powder of a Boars tooth a dram, Syrup of Violets ten drams: make it into a Julep to be taken after the same manner.

Apozemes.

Take Grass-roots three ounces, shavings of Ivory and Harts-horn each three drams, Raisins stoned an ounce and half, Liquorish two drams, boil them in Spring-water from three pints to two, to the strained liquor add Syrup of Violets an ounce, Sal prunellæ a dram: make an Apozem to be taken thrice a day about three or four ounces.

Purgation.

For the same intention, *viz.* that the Vessels being emptied may withdraw the nourishment from the disease, or sup up the morbific matter, a Purge is prescribed by many. In the Practice of the Ancients against this disease, even as against many others, after Phlebotomy, Preparatives and Purgatives were usually appointed in a constant course, and of late the Chymists with greater boldness do recommend Vomits, and in a Peripneumony prefer it to all other remedies. Yea Phlebotomy being omitted or countermanded, they place the chief Cure in stibiate Vomits: than which rash advice of theirs I know not any thing may be thought of more pernicious. Indeed in rustic and robust bodies sometimes this Cure has been effected without danger, notwithstanding for the most part no less unsuccessful; but in tender constitutions it ought to be reckoned little inferior to poyson. But for what respects Purgation, although it may not be presently convenient from the beginning, because it is then for the most part prejudicial, nevertheless the flowing of the morbific matter being finished, and the effervescency of blood being appeased, we may safely and gently evacuate the body with a loosning Purge.

Purges.

Take of the decoction of Senna of Gereon *four ounces, syrup of Roses solutive an ounce: mix them for a Potion.* Or,

Take the best Senna three drams, Cassia and Tamarinds each half an ounce, Coriander seed two drams: boil them in a sufficient quantity of Spring-water to six ounces, to which strained add syrup of Violets an ounce, clarified with the white of an Egg, and let it be given.

Purgatives are not always to be exhibited, nor ever unadvisedly in this disease: but frequent Clysters, and almost daily are in use; but let them be gentle and emollient only,

only, which eaſily looſen the belly, without any great agitation of humours or blood. For this purpoſe Milk or the Whey thereof is often convenient, with red Sugar, or ſyrup of Violets: Or, *Take the leaves of either ſort of Mallowes, of Melilote, of Mercury, of each one handfull, Linſeed and ſweet Fennel-ſeeds, of each half an ounce, ſweet Prunes, numb.* vi. *boyl them in a ſufficient quantity of Spring-water to a pinte, to which adde ſyrup of Violets one ounce, Sugar ten drams, ſal Prunella one dram, make a Clyſter.* *Clyſters.*

3. Medicines for the third intention, *viz.* for the diſſolving the Clammineſs of the Blood, are wont to be adminiſtred in form of a Powder, of a Spirit, a Potion, or of a Bolus, according to the manner following. *Things diſſolving the clammineſs of the blood.*

1. Powders.

Take of Crabs eyes two drams, ſal Prunella one dram and half, pearl'd Sugar one dram, make a powder for 6 doſes, one to be taken every ſixth hour, with a proper Julep or Apozeme. Or, *Powders.*

Take of the Tusk of a Boar, (or the Jaw of a Pike) of Crabs-eyes, of each one dram and half, flowers of Salt Armoniack, Powder of red Poppy Flowers, of each half a dram, mix them for 4 doſes.

2. Spirits and Chymical Liquors.

Take of ſpirit of ſalt Armoniack diſtill'd with Olibanum, 3 drams; the doſe from 12 drops to 15 or 20, three times in a day. Or, *Spirits.*

Take Spirit of Urine or Soote, after the ſame manner, three drams.

Take of the ſweet Spirit of Nitre, (viz. often cohobated with Spirit of Wine,) 3 drams, the doſe from 6 drops to ten after the ſame manner.

Take half an ounce of Spirit of Tartar, doſe 15 drops to 20 or 25, in a fit vehicle.

Take of the ſimple mixture one ounce: the doſe is one ſcruple to half a dram, after the ſame manner.

3. Potions.

Take of Carduus-water one pound, freſh Horſe-dung 3 ounces, diſſolve it warm, and filtre it; the doſe is 3 or 4 ounces, twice or thrice in a day, with half an ounce of Syrup of Violets or red Poppyes. *Potions.*

Take of the Leaves of Dandelyon two handfuls, bruiſed and infuſed in half a pound of Carduus Mariæ water, Treacle-water half an ounce, preſs it out, and adde powder of Crabs-eyes one dram: take 4 or 6 ſpoon-fuls three times a day.

The fourth intention of Healing in reſpect of the ſymptomes greatly urging, doth ſuggeſt divers ſorts of preparations of Medicines. 1. In reſpect of the Feaver, the Juleps and Apozemes above recited are convenient. Moreover, the uſe of Mineral Cryſtal ought to be frequent. 2. For the Cough and difficult Breathings, Linctus's, Eclegma's, and Decoctions, or pectoral Juleps are adminiſtred with ſucceſs. *The cure of the Symptomes.*

Take of Syrup of Jujubes, of Maiden-hair, of each one ounce and half, of Violets one ounce, flowre of Nitre one ſcruple; make a Linctus to be lickt now and then. *Linctus's.*

Take of ſyrup of Marſh-mallowes one ounce, Diacodium, red Poppyes, each half an ounce, powder of Crabs-eyes two ſcruples; make a Lohoch, to be taken the ſame way.

Take Syrup of Hyſſop, of Liquoriſh, of each one ounce and half, red Poppy-flowers powder'd, one ſcruple, Crabs-eyes one dram, Lohoch de Pino 6 drams, make a Lohoch, take the quantity of a Nutmeg four times or oftner in a day. *Lohochs.*

Take the roots of Graſs, Chervil, Marſh-mallows, of each one ounce, Figgs numb 4. Jujubes and Sebeſtens, of each numb. 6, Raiſins one ounce, Liquoriſh three drams, Barly half an ounce, boyl them in three pints of Spring-water to two, ſtrayn it; the Doſe three or four ounces. *An Apozem.*

Take Raiſins ſtoned one ounce and half, Filberds numb. 4. cut, Liquoriſh ſliced 3 drams, of Hyſſop-water a pound and half, infuſe them warm in a cloſed Veſſel 6 hours, ſtrain, and adde Syrup of Marſh-mallows an ounce and half, make a Julep, the doſe is 3 or 4 ſpoonfuls often in a day, ſwallowing it by degrees.

Againſt Watchings. 3ly, Againſt Watchings, *Take Poppy-water 3 ounces, Syr. of red Poppies 6 drams, Aq. Epidemica 2 drams, for a draught, to be taken at night.*

If the Pulſe be ſtrong, and the ſtrength agreeable, *Take Cowſlip-water 3 ounces, ſyrup de Meconio half an ounce, for a draught at night.*

For Pain. 4. If the pain be troubleſome about the place affected, *Take Oyntment of Marſh-mallows two ounces, Oyl of ſweet Almonds an ounce and half, mingle them for a Liniment to be applyed with thin Lawn-paper.*

Take of Oyntment of Marſh-mallows and pectoral Oyntment, of each an ounce and half, Linſeed Oyle freſh drawn one dram, to which adde the Plaiſter call'd Emp. de Mucilaginibus, make a Plaiſter for the Region of the breaſt, to be applyed on the place affected.

Fifthly, For the laſt intention of curing which anſwers to the ſecondary Indication, and preſcribes Medicines ripening and expectorating, the following forms are convenient.

Maturating Medicines. *Take Linſeed Oyl freſh drawn three ounces, Syrup of Violets two ounces, Hyſſop-water half a pound, mixe them in a Glaſs, take two or three ounces three times in a day, ſhaking the Glaſs firſt.*

Take powder of Olibanum one dram, put it into an Apple made hollow, and roaſt it in hot Embers, let him eat it at night, repeating it three or four times.

Expectorating Medicines. *Take Oyl of Almonds freſh drawn, Syrup of Maiden-hair, of each an ounce and half, Sugar-Candy two drams, ſtirre them well in a Glaſs-mortar untill they are perfectly mixt, make a Linctus to be taken often in a day with a Liquoriſh ſtick; alſo let a ſpoonfull be taken three times a day in a draught of Poſſet-drink.*

As to the reſt, Remedies preſcribed againſt a beginning Conſumption do alſo profit in this caſe.

It would be eaſie to heap up here many Hiſtories and Inſtances of Patients affected with a Peripneumonie; but whereas the ſame order and figure of the diſeaſe, and the ſame reaſons of the Symptoms are almoſt in all, it ſuffices here to note one or two Examples only. *The firſt Hiſtory.* And while I was writing theſe things I am ſent for to a Patient grievouſly ſick with a Peripneumonie. He was aged about Fifty years, lean in body, and of a cholerick temper, by taking cold he fell into a Feaver, with a Cough, with pain of the Breaſt, and difficult breathing: when he had laboured thus four dayes without any remedy or phyſical adminiſtration, I found him in a notable Feaver, with thirſt, and a huge inflammation of the Precordia, breathing very difficultly, with labour of the Thorax, and painfully, with a noiſe of the Bronchia, inſomuch that he ſeemed evidently in the very Agony of death. His Pulſe being ſtrong enough (although quick and diſturbed) I immediately preſcribed Phlebotomy, to eight or ten ounces, by which when he received a little relief, after three hours intermiſſion, a Clyſter being firſt adminiſtred, I ordered him to repeat his bleeding to twelve ounces: Moreover, I ordered Spirit of Harts-horn to be given twelve drops every ſixth hour, with an appropriate Julep, and in the diſtance between I ordered a doſe of the following Powder to be adminiſtred:

Take powder of Crabs-eyes, ſal Prunella, of each one dram and half, Pearles a dram, Sugar-Candy two ſcruples; make a powder to be divided into 8 doſes.

Moreover, he took as often as he pleaſed a draught of a pectoral Apozeme. By the uſe of theſe within three hours all the ſymptoms began to abate, and the night following he ſweat, and ſlept a little; the day after I repeated Phlebotomy, and after continuing the ſame Remedies in four or five dayes he intirely recovered his health. The blood we took from him was alwayes in the Superficies viſcous and diſcoloured.

The ſecond Hiſtory. A certain Gentleman of a ſanguine Complexion and a ſtrong habit of body, after an immoderate drinking of Wine contracted a Feaver, with a moſt painful Peripneumonie, inſomuch that thirſt and heat mightily preſſing him, ſitting always upright in his bed or Chair, and breathing ſhort and very frequent, he could ſcarcely, yea almoſt not at all ſuck in air enough to ſuſtain the vital flame. Becauſe he could not undergoe a large Phlebotomy, I drew blood twice or thrice day after day; frequent Clyſters were adminiſtred: Moreover, Apozemes, Juleps, alſo Spirit of Armoniack, and

powder

powders of Fiſh-ſhells were adminiſtred by turns. Within four or five dayes the Feaver ſomewhat abated, alſo he began to breathe better, and ſometimes to take ſhort ſleeps, yet he did always complain of a notable heavineſs of his breaſt, and intolerable oppreſſion of the Lungs; wherefore, when Phlebotomy was no longer ſafe, I applyed very large Veſicatories to his Arms and Thighs, the bliſters in his arms dry'd up in a ſhort ſpace, but thoſe on his legs did not only remain open, but after five or ſix days did run hugely, and afterwards almoſt for a month daily diſcharged great plenty of a moſt ſharp ichor; in the mean time his lungs ſenſibly amended, and at length were delivered from all their burden; laſtly, the little ſores raiſed by the Veſicatories very painfully and not without frequent Medicines could be cured.

SECT. I. CHAP. IX.

Of a Pleuriſie.

The diſeaſes of a Pleuriſie and Peripneumonie are akin.

HOw great affinity there is between a Pleuriſie and Peripneumonie, we have hinted before; *viz.* although either diſtemper is ſometimes ſolitary, and exiſts ſeparately from the other, yet they often happen together, or one while this, another while that, come one upon the other, or ſucceeds it. The foregoing cauſe is the ſame of both, *viz.* a diſpoſition of the blood to be clammy and boyl up withall; alſo, the conjunct cauſe is the ſame, *viz.* an obſtructing Phlegmon in ſome part of the leſſer Veſſels, by reaſon of ſuch a diſpoſition of blood. Moreover, the ſame method of Cure is preſcribed by moſt modern Phyſicians for either diſeaſe: The chief reaſon of the difference whereby they are diſtinguiſhed one from the other, is taken from the places affected, which their Names denote. For the blood prediſpoſed to the enkindling in ſome place an enflaming obſtruction, therefore often plants the neſt of the diſeaſe in the breaſt, becauſe here it burns out more hideouſly, by reaſon of the Hearth of vital fire; and alſo is not freed from the vaporous Effluviums and other Recrements which hinder Circulation. To all which there enſues, that in this Region, the maſs of blood being ſhut up, and not able to paſs through the more ſtrait Conveyances; is not as in the bowels of the lower Belly, opened with any ferment, or new waſht with any watery juice: wherefore, if perhaps the blood, carried through the vertebral Arteries into the membrane encompaſſing the ribs, ſhall ſtick in its paſſage, about the narrowneſs of the Veſſels or inter-ſpaces, the Diſtemper of which we now treat ſucceeds: In like manner, if an obſtruction happen within the paſſages of the Lungs, a Peripneumonie will enſue, as we have declared before. Wherefore, according to the Pathologie of this diſeaſe before delivered, thoſe things which belong to the Theory of a Pleuriſie, as well as the Curatory method, may with ſmall labour be deſigned.

How they differ betwixt themſelves.

The ſeat of a Pleuriſie.

Both the ſenſe of pain, as well as Anatomical Obſervations taken from the Patients dead of a Pleuriſie do plainly atteſt, the ſeat of this Diſeaſe (as often as it exiſts primarily and ſolitarily) conſiſts in the Pleura or Membrane environing the inſide of the ribs. And a true and ſingular Pleuriſie is an inflammation of the Pleura it ſelf, from the abundant flowing in of inflamed blood, growing clammy withall, taking its motion through the vertebral Arteries, with a continual and acute Feaver, a pricking pain of the ſide, a Cough and difficulty of breathing.

The next cauſe of it.

The next Cauſe is the blood obſtructed by reaſon of its clammineſs in the leſſer veſſels and interſpaces of that membrane (in like manner as it is in a Peripneumonie) or being extravaſated, being heaped in the ſame place more plentifully, by reaſon of the ſwelling up, for that cauſe exciting an inflammation. An acute pain ariſeth upon this, by a wound in a part highly ſenſible; alſo there ariſeth a Cough by reaſon of a provocation giving impreſſion to the intercoſtal muſcles; moreover a difficult breathing by reaſon of the muſcular fibres being hurt as to their action; which becauſe they cannot perform long and ſtrong contractions, they are conſtrained to undergoe weak although more frequent Contractions: otherwiſe than in a Peripneumonie, in which that ſymptome ariſeth from a Lung too much fill'd and ſtuffed. The Feaver is caus'd from efferveſcence of blood, and is for the moſt part rather the aſſociate than the ef-

fect of a Pleuriſie. For the blood from what cauſe ſoever driven into a feaveriſh turgeſcency, if it be bound up together in its maſs, will be apt to grow clammy, which together with the Feaver moſt often induces a Pleuriſie or a Peripneumonie, or both of them. From hence we may obſerve this diſeaſe doth frequently vary its kind, and change its place, *viz.* from a Pleuriſie into a Peripneumonie, and on the contrary; afterwards it paſſes from both or either into a Frenzy or a Squinancy: for that the blood while it is boyling throws off its viſcous recrements one while in this part, another while in that, another while in more together, and laſtly it reaſſumes them again, and variouſly transferrs them.

The more remote cauſes of this Diſeaſe.

The more remote cauſes of a Pleuriſie are the ſame as of a Peripneumonie, *viz.* whatſoever ſtirs up the blood, prediſpoſed to grow clammy and alſo to boyl up, and provokes a feaveriſh turgeſcency. Hither appertains exceſs of heat and cold, a ſudden conſtipation of the pores, ſurfeit, drinking of Wines or Strong-waters, immoderate exerciſe; ſometimes the malignant conſtitution of the Air brings this diſeaſe almoſt on every body, and renders it Epidemical: whereto may be added, that this diſeaſe is very familiar to ſome from their conſtitution or cuſtome; ſo that a diſtemperature of blood, induced almoſt by any occaſion, immediately paſſes into a Pleuriſie.

From what we have already ſaid, the ſigns of this diſeaſe do appear manifeſt enough, by which it is well known as to its Eſſence, and is diſtinguiſhed from other diſeaſes, and eſpecially from a Baſtard Pleuriſie and a Peripneumonie. But it is to be obſerved that a pain in the ſide ariſes ſometimes very troubleſome, which while it counterfeits a Pleuriſie, is ſometimes taken for it, although falſly. For in ſome perſons obnoxious to the Scurvy, and the affects of the nervous kinde, ſometimes it happens that a ſharp humour, and very painful deſcends into the Pleura or intercoſtal Muſcles, and being fixt there produces moſt fierce tortures; which diſtemper is yet diſcriminated from the Pleuriſie, inaſmuch as it is void both of Feaver and Thirſt, the Pulſe always abides moderate and laudable, frequently the appetite and ſtrength endure; moreover, the pain is not long fixed or limited to one place, but ſenſibly creeps hither and thither into the neighbouring parts, as the matter ſlides down through the paſſages of the fibres, out of one place into another.

The differences of it.

We meet not with many differences of this diſeaſe; notwithſtanding it is uſed to be diſtinguiſhed, *viz.* to be either true and exquiſite even as we have now deſcribed, or ſpurious, which having its ſeat in the intercoſtal muſcles, or their interſpaces, proceeds from winde, or a ſerous and ſharp humour heaped up in the ſame place, and raiſes a pain leſs ſharp, without ſo much as an inflammation or feaver: And whereas the grief is planted externally, the Patient for the moſt part lyes better on the oppoſite ſide, otherwiſe than in a true Pleuriſie. Secondly, a Pleuriſie is either ſingle, or complicated with a Peripneumonie or ſome other diſtemper, and ſo it is either primary, or ſecondary, or join'd with ſome other affection.

The Prognoſticks.

As to the Prognoſticks of this diſeaſe, *Hippocrates* hath obſerved many certain tokens whereby a good or evil event is ſignified to patients ſick of the Pleuriſie. To run through each of theſe, and to unfold them with Commentaries added to them, we have neither leiſure, nor doth it ſeem worth our endeavours. The chief thing of all in a Pleuriſie, is, that the diſeaſe be preſently diſpatch'd, partly with a free and frequent bleeding, and partly by a Critical Sweat, ariſing about the fourth day, or before the eighth; or theſe things not duely ſucceeding, it will be prolonged, and then moſt frequently a Peripneumonie or Empyema, or a collection of corrupt matter between the Breaſt and Lungs, or both diſtempers do ariſe upon this diſeaſe; from which there follows a ſolution of the diſeaſe but ſlow and incertain, and moſt frequently full of dangerous chances.

A Peripneumonie coming upon a Pleuriſie not preſently cured (as it is often wont to be) all our hope is placed in digeſting maturely the Spittle and quick Expectoration thereof: for if this be laudable and plentiful, and eaſily and haſtily thrown off, it doth often finiſh both diſeaſes intirely. Notwithſtanding, it is not therefore a conſequent that the matter of a Pleuriſie is derived from the ſide into the Lungs by I know not what blinde paſſages, or that the ſame being ſweat out of the Pleura into the cavity of the breaſt is imbibed by the Lungs, and at length drawn upwards through the paſſages, and excern'd forth. But when a Peripneumonie ariſes on a Pleuriſie, and the matter impacted in the Lungs begins to be evacuated by Spittle, ſo that the affected places of the Lungs are continually emptyed; the blood reſumes

the

the other matter fixed in the Pleura, and carryes it to the Lungs where the places of conveyance are open, to be ejected by Spitting. But if the Pleuriſie be cured neither by it ſelf, nor aſſociating with a Peripneumonie, then at length either by an Impoſthume made in the Pleura or in the Lungs, an Empyema or corruption between the Breaſt and Lungs ſucceeds; or all the matter being brought into the Lungs and there putrified, looſning the unity of the Viſcera, it propagates a mortal or ſcarce curable Conſumption.

The Cure thereof.

As to the cure of a Pleuriſie, foraſmuch as the ſtate of this Diſeaſe, the Criſis and tendencies are manifold, divers curatory Indications offer themſelves according to their various regards; and as occaſion ſerves, according to the advice of a prudent Phyſician, they ought to be appointed in the beginning, and ſometimes altered or continued. For ſurely one Method is convenient for a ſolitary and ſimple Pleuriſie, and another if it be complicated with a Peripneumonie: Beſides it behoveth to ordain another and another if perhaps a Criſis be expected by Spitting, or matters growing worſe, the diſeaſe is either paſſing into an Empyema, or tends to a Conſumption. As to the three later caſes, that is to ſay, when a Pleuriſie commencing, paſſes into a Peripneumonie or Empyema, or laſtly into a conſumptive diſpoſition, there is deſigned an appropriate way of curing in the pathologies of each of theſe diſeaſes particularly delivered. But as to what appertains to our preſent purpoſe, three Indications offer themſelves for a primary and ſimple Pleuriſie, and they are curatory, preſervatory and vital.

The firſt Indication.

I. The firſt Indication takes care that the Inflammation or obſtruction of blood in the Lungs by all manner of means with all expedition be removed; for which intent phlebotomie in every Age by all phyſicians (excepting ſome Fanatick or falſe Chymiſts) is wont to be preſcribed, as a principal remedie: The reaſon of which is altogether the ſame as in a Peripneumonie and many other diſtempers, cauſed by reaſon of a ſtop of blood in ſome place, and ſo an accumulation: Becauſe that the veſſels bringing blood being much emptyed, do not only reſcind the nouriſhment of the diſeaſe, but drink up the matter which is the conjunct cauſe thereof, and convey it to another place. Wherefore blood is to be freely drawn away in a Pleuriſie, if the ſtrength endure it, and the Pulſe be ſtrong. And ſurely it is far better that the firſt time and every time after (as often as there is need to repeat it) blood be more largely emitted, than to do it more often and more ſparingly. For very many portions of the blood growing clammy and degenerating into viſcouſneſs, are heaped up about the place affected; which, unleſs they are call'd away from thence by emptying the Veſſels through large phlebotomie, and in a great part let forth, the letting of blood will be fruſtrated of its deſired effect. Wherefore, that Phyſicians preſcribe blood in a Pleuriſie to be drawn out even to ſwooning, ſeems not incongruous to reaſon, although that practice is not raſhly to be attempted, for that every evacuation ought to be proportioned to the tenour and tolerance of the ſtrength, which rule ſuch a phlebotomy doth exceed.

Phlebotomie neceſſary almoſt in all Pleuriſies.

What Vein is to be opened in a Pleuriſie.

But though there is almoſt a general conſent of all Phyſicians to breath a vein in a Pleuriſie, notwithſtanding there was ever an earneſt contention about the place, what Vein ought to be opened. *Hippocrates* and *Galen* opened a Vein on the ſame ſide of the patient; afterwards the *Arabians* and their followers the *Italians*, and *French*, did either open the *Saphene* or the *Baſilica* of the oppoſite ſide, damning the phlebotomy of the ſame ſide by Bell, Book and Candle. Yet in the later generation, the practice of the Ancient *Greeks* by little and little revived, ſo that ſome did dare to make inciſion on the ſame ſide; yet always one ſide judged the others of the oppoſite perſwaſion as it were guilty of murder, as often as any unlucky event did happen. So that while among Phyſicians about phlebotomy there was no leſs a contention than among the *Jews* and *Samaritans* about the Sacred place of Worſhip, at length the Doctrine of the Circulation of the Blood held out like a new Light by the moſt renowned *Harvey*, diſcuſs'd all the clouds of this Controverſie; ſo that immediately it clearly appeared to be almoſt the ſame thing, whether inciſion be made in the Vein on the affected or oppoſite ſide of a patient ſick of a pleuriſie; although in our Age Cuſtom hath prevailed firſt and rather to open the Vein of the affected ſide. Notwithſtanding a Vein being opened in either Arm draws nothing at all immediately from the vertebral Arterie or from the pleura; they are only the branches of the Azygos, or of the vertebral vein that receive the blood out of the place affected: but that they may accompliſh this, they are not unloaded in any other manner, but

Various opinions are recited.

that

that the quantity of the whole blood be abated by phlebotomie whereſoever made. Onely this may be affirmed for opening rather the vein of the affected ſide, that the Baſilick vein being unloaded, the Arteries of the Arm receive the more ample proviſion of blood; from hence the bloody ſtream of the vein Aorta runs down more ſwiftly from that ſide towards the branches of the Arm, and perhaps in the interim of its quick paſſage it infuſes leſs blood into the vertebral Arteries, for the nouriſhment of the diſeaſe. As to that opinion, that the blood is ſometimes more plentifully carryed from place to place, that from hence the right Lung or Liver being beſet with an inflammation or obſtruction, the right part of the head is in pain, and of the face grows more red; I ſay this ſometimes is brought to paſs, becauſe the patients do conſtantly lie in their bed on the ſide affected; wherefore, the Veſſels being compreſs'd, the blood ſtays longer in other parts of the ſame ſide while it is circulating. But of theſe things we will make a more diligent ſearch when we ſhall render the Hiſtory and Ætiologie of phlebotomy.

Cupping-glaſſes with Scarification ſupply the place of blood-letting.

But if phlebotomy by reaſon of a weak pulſe, and fainting of the animal function, neither ought to be at firſt adminiſtred, nor repeated, though the pain be moſt urging; Cupping-glaſſes with Scarification do well ſupply the turn hereof, being applyed to the place pained. *Riverius*, and *Zacutus Luſitanus* have cited notable Examples of cures effected by this remedy. And ſurely this practice ſeems to lean upon a reaſon ſtrong enough; for the blood being drawn away from the ſide affected, that which is lodged in the neighbouring veſſels, being the conjunct cauſe of this diſeaſe, is moved with it, and partly drawn away, and partly turned to its Circulation. Moreover, to remove an inflammation of the Pleura, beſides withdrawing blood by a free Phlebotomy or Scarification, alſo the ſerous and other excrementitious humours ought to be gently ſolicited and excerned as well out of the maſs thereof, as out of the bowels, by Stool, Urine and Sweat. The more ſtrong purgatives are deſervedly prohibited, becauſe they diſquiet the blood, and conſtrain it to be impacted more deep into the places affected. And that certain renowned Chymiſts, viz. *Angelus Sala*, *Hartman*, *M. Rulandus*, with many others, do audaciouſly exhibit Vomits of Stybium to any afflicted with a Pleuriſie, and magnifie it for the beſt remedy, ſeems to me neither ſafe nor congruous to reaſon; the only reaſon of helping, as I think, and that very uncertain, and full of danger, may be, *viz.* that the medicine operating more vehemently while the patients ſuffer exolution of ſpirits or ſwoonings, all the vigour and turgeſcence of the blood abates, and for that cauſe the nervous Fibres remit their wrinklings or painfull contractions, and the Veſſels carrying blood being much emptyed, do ſuck up the morbifick matter: In the mean time, there is danger leſt the humours being violently diſturbed, ruſh more impetuouſly to the part affected; at leaſt, leſt the Spirits being too much dejected, and the work of Nature diſquieted about the digeſting or ſeparation of the morbific mater, ſtrength ſhould utterly fail, before the diſeaſe be cured. Yet in the mean time, Clyſters are of frequent or daily uſe: yea ſometimes more benigne ſolutive purgatives are allowed, provided that the Feaver be not very intenſe. Julips and temperating Decoctions and things gently moving Sweat and Urine, as we have preſcribed before for a Peripneumonie, are alſo here convenient; but let all hot and ſharp things, whether aromatick, or endowed with a vinous ſpirit be carefully declined.

Whether Purges and Vomits are to be taken in a Pleuriſie.

What other kind of Remedies are convenient in this diſeaſe.

The ſecond Indication preſervatory.

II. The ſecond Indication preſervatory, deſigned againſt the clammineſs and boyling up of the blood, preſcribes Medicines of that ſort which conſiſting of a volatile or alcalizated Salt, do deſtroy the combinations entered into, of the acid and fixed or otherwiſe diſtempered Salts, with the other more thick particles. For which intent the eyes or claws of Crabs, the tooth of a Boar, the Stone of Carps, the jaw of a Pike Fiſh, the Bone in the heart of a Stag, the Priapus of a Hart, Sal Prunella, Salt of Coral, Salt of Urine, or volatile ſalt of Harts-horn, powder of Goats-blood, infuſion of Horſe-dung, Spirit of Harts-horn, of ſalt Armoniack, Spirit of Tartar, the ſimple mixture, mineral Bezoar, Diaphoretick Antimony, flowers of ſalt Armoniack, are very famous Remedies in a Pleuriſie.

The third Indication vital.

III. The third Indication vital which provides that the ſtrength and vital heat be preſerved during the courſe of the Diſeaſe in due tune and ſtate, gives in precept firſt an apt kind of food, and moreover Cardiac and Anodyne remedies, and thoſe which ſeaſonably occur to other ſymptomes, if perhaps they ariſe. Firſt, in a true Pleuriſie, a moſt thin Diet ought to be appointed, *viz.* of meer Oatmeal and Barley; and for ordinary drink, a Ptiſan or Poſſet-drink rather than Beer alone:

alone is convenient: although in an outragious thirſt this alſo is to be allowed of in a moderate quantity. Moreover, for quenching thirſt, Juleps, Apozemes, and Emulſions are taken by turns; to all which adde Sal Prunella. Secondly, let only the temperate Cordials be adminiſtred which mildly do recreate the animal ſpirits, and not at all intend the kindling of the blood, burning out of its due proportion. For theſe intentions, the water of *Carduus Mariæ*, *Carduus Benedictus*, of Balm, Borage, Cowſlips, Black-cherries, are uſually given with ſucceſs: whereto let the powder of Pearls and Coral be added. Thirdly, It behoveth to adminiſter Anodynes, both inwardly, to provoke ſleep in caſe it be very much wanting, and alſo externally, to alleviate the pain of the ſide. Of the former kinde the more uſual are the diſtill'd water, ſyrup and powder of red Poppies, which are eſteemed Specificks in a Pleuriſie and in a Peripneumonie: Moreover, when the pain is very acute, and watchings inſtant upon the patient, they may lawfully drink Diacodiates. Againſt pains, Liniments, Fomentations, Cataplaſmes, and ſometimes the hot bowels of Animals newly ſlain are convenient to be applyed. Theſe are the principal Intentions of healing which ſeem requiſite to cure an exquiſite and ſimple Pleuriſie, before it contracts a Peripneumonie to it ſelf, or paſſes into it, or into an Empyema. It only remains to adapt to each of theſe the more ſelect forms of Medicaments.

Cardiacks.

Anodynes.

Firſt therefore in the beginning of the Diſeaſe, for taking away the Phlegmon, Juleps, Apozemes, Powders, and gentle looſening Clyſters are wont to be preſcribed.

Forms of Remedies.

Take water of Carduus Mariæ eight ounces, red Poppies 4 ounces, Syrup of red Poppies one ounce, ſal Prunella one drachm, make a Julep, the doſe two or three ounces every third hour.

First for the removing the Inflammation. Juleps, & Apozemes.

Take of Graſs-roots 4 ounces, Barly half an ounce, Apple-parings one handfull, Raiſins one ounce, Liquoriſh two drams, boyl them in three pints of Spring-water to two; clarifie the ſtrained liquor, adding Syrup of Violets one ounce and half, Sal Prunella one dram and half, make an Apozeme, the doſe 3 or 4 ounces often in a day.

Take of Sal Prunella two drams, flowers of Nitre one dram, powder of red Poppy flowers two ſcruples, Sugar-candy 4 ſcruples, make a powder, the doſe half a dram three or four times in a day.

Powders.

Take of the Decoction of Mallows, leaves and roots, with Prunes, one pound, ſyrup of Violets three ounces, Sal Prunella one dram, make a Clyſter.

A Purge.

Take Caſſia bruiſed two ounces, Tamarinds one ounce, Damask-Roſe leaves one handful, Coriander-ſeeds two drams, boyl'd in Spring-water to a pint, ſtrain it, and adde Syrup of Chicory with Rhubarb two drams, clarifie it with the White of an Egge, the doſe is 5 or 6 ounces in the morning, continued for two or three dayes.

Secondly, The following are of uſe to diſſolve the clammineſs or coagulating viſcoſity of the blood, in form of a Drink, of a Powder, and of Spirit.

Secondly for the taking away the Clammineſs of the Blood.

Take freſh Horſe-dung 4 ounces, Carduus-water one pound and half, infuſe it warm for two hours, after filtre it, to which adde ſyrup of the juice of Dandelyon, or of Chicory, two ounces, Spirit of ſalt Armoniack one dram, let five or ſix ſpoonfuls be given three or four times in a day.

An Infuſion of Horſe-dung,

To this end Water of Horſe-dung wonderfully profits.

Take of Horſe-dung 4 pounds, leaves of Carduus Benedictus, Carduus Mariæ, Scabious, Pimpernel, of each three handfuls, upon them cut and mixt together pour ſix pints of new Milk, diſtill them in common Organs. The Doſe is from two Ounces to three, either with it ſelf, or with other diſtill'd Waters, in form of a Julep.

And diſtilled water.

For the ſame uſe, the Tinctures, or the ſolutions of other Dungs are adminiſtred by ſome Phyſitians, and highly magnified by them. *Helmont* commends the dung of an Oxe, *Panarolus* commends Pidgeons-dung, others the white dung of a Cock, for the Pleuriſie. *Epiphanius Ferdinandus* was wont to give with ſucceſs the Decoction of Tobacco with new Wine; *Valeriola* by experiment as a familiar remedy made uſe of the Decoction of the Flowers of red Poppies: The renowned *Sylvius* preſcrib'd the following mixture to be taken by Spoonfuls, within ſhort ſpaces of time.

Sylvius's *Anti-Pleuritick.*

Take

Take Parſly and Hyſſop water, of each two ounces, Fennel-water one ounce, Treacle-water ſimple half an ounce, Laudanum Opiate 4 grains, Salt Armoniack half a ſcruple, Syrup of red Poppies one ounce. Mingle them.

Frederick Deckers adds to this the *Powder of Crabs-eyes*, and *Mineral Bezoar*, *of each one ſcruple.*

Medicines chiefly efficacious for this uſe are wont to be adminiſtred in the form of a powder: for examples ſake,

Powders.

Take Powder of Crabs-eyes two drams, Sal Prunella one dram and half, of the flowers of red Poppies half a dram, mix them and make a Powder, the doſe half a dram, three or four times a day, in a convenient Vehicle.

Inſtead of Crabs-eyes, the powder of the Jaw of a Pike, or the Tusk of a Boar, or the Pizzle of a Stag, or Bull, are uſed, and if they prove ineffective, try the following.

Take of Antimony Diaphoretick, or the Ceruſs thereof, or Bezoar Mineral, two drams, the volatile Salt of Harts-horn half a dram, the powder of red Poppies two ſcruples, make a Powder; The doſe from one Scruple to half a dram, three times or oftner in a day.

For the ſame intention of curing it was, that *Riverius* gave of the Powder of *Soot* from half a dram to a dram; others the powder of Pidgeons dung, or of a Cock. And indeed by reaſon of this analogie, whereby the dungs of Animals ſtored with volatile Salt, do ſuccour in this diſeaſe; it is probable, the dung of a Dog doth no leſs conduce to cure a Pleuriſie than a Squinancy, and ſo much the rather, becauſe theſe diſeaſes frequently change their forms among themſelves, and one aſſumes the ſpecies of the other. Chymical liquors endued with a volatile Salt do alſo notably help ſometimes in a Pleuriſie.

Chymical Liquors.

Take of Spirit of Blood two drams, Water of red Poppies three Ounces, the Syrup of the ſame one ounce. Let it be given by ſpoonfuls often.

Take ſpirit of Sal Armoniack, diſtill'd with Olibanum, three drams, the doſe from 12 drops to 15 or 20, twice or thrice a day, in any convenient liquor. After the ſame manner the Spirit of Urine, Soot, or Harts-horn may be given.

Take the Spirit of Tartar 3 drams, the doſe one ſcruple in a convenient vehicle.

Take of the ſimple mixture 3 drams; Doſe from one Scruple to half a dram.

What remedies the third intention requires.

As for the third Intention, beſides a thin diet, Cardiac remedies and Anodynes are preſcribed. Examples of the former kinde for the firſt Indication may be ſupplyed by Juleps and Apozemes; for the ſecond Indication they may be ſupplyed by Spirits and Powders. Anodynes are preſcribed to be exhibited inwardly upon watching, and very intenſe pain, according to the following method.

Hypnotick Anodynes.

Take of Poppy-water two ounces, the ſyrup of the ſame 6 drams, Spirit of Harts-horn 12 drops, make a draught to be taken at Bed-time.

If we muſt proceed higher, *Take Carduus-water two ounces, Diacodium from three drams to half an ounce or 6 drams, Spirit of Sal Armoniac with Frankincenſe half a ſcruple, make a draught: and ſometimes although rarely Laudanum is expedient, which timely given, inaſmuch as it excites ſleep, and moves ſweat and Urine, does greatly profit.*

Take Cowſlip-water two ounces, Tartariz'd Laudanum from 16 drops to 20. the Spirit of Blood half a Scruple, Syrup of Violets two drams, mingle them for a draught.

External Anodynes.

Outward Anodynes in form of a Liniment, Fomentation, and Cataplaſm, are uſually preſcribed,

Take Oyntment of Marſhmallows two ounces, Oyl of Almonds one ounce, Dogs-turd two drams, mix them by grinding together.

Take the Plaiſter of Mucilages two ounces and a half, moiſtened with Linſeed-Oyl, and applyed upon Lawn-paper.

Take the tops of both Mallows, the leaves of Mercury and Beetes, of each 4 handfuls, boyl

boyl them in Spring-water, and ſtrain'd, let it be uſed for Fomentation.

Take the Dregs of the herbs after the liquor expreſſed, to which adde the bran of Oats 6 ounces, Linſeed and Fœnugreek-ſeeds, of each two Ounces, Oyntment of Marſh-mallows two ounces, make a Cataplaſme.

An Hiſtory.

There is no occaſion to go far for Hiſtories and Inſtances of patients ſick of a Pleuriſie, for a notable Example of this diſeaſe is now under our hands: to wit, A very lovely Maid, frequently and as it were habitually obnoxious to that diſtemper, is committed to our care. This Virgin being very amiable, of a ſanguine complexion, but of a weakly conſtitution, upon any the ſmalleſt occaſion, *viz.* by taking cold, or by errors in any of the ſix Non-naturals, yea ſometimes from the meer alteration of the year, or the air, has for many years been wont to fall into a feaver; whereupon immediately pleuritick pains, with a Cough and difficult breathing come upon her, and afterwards for the moſt part hideous Convulſions; under which paſſion in time paſt ſhe did ſo grievouſly labour, that frequently every year for or above ſix months ſhe was conſtrain'd to keep within her Chamber. But of late, although ſhe is not acquitted from this hurt, yet ſhe is ſeldomer puniſh'd with it. The laſt year all the Summer, and almoſt the Autumn, ſhe enjoyed her health indifferently; in the beginning of Winter ſhe took her bed with this ſickneſs, and now about the end is again ſick. A pain from the Pleuriſie conſtantly afflicts her right ſide, where the blood ſticking in its paſſage, and being extravaſated about the intercoſtal muſcles, the Fibres being provoked, fall into a moſt troubleſom condition, together with a convulſive motion of Coughing, and almoſt perpetually repeat it: In the mean while her Lungs being ſound enough, and open as to the paſſages, do readily convey the blood without any ſtop by its clammineſs, (which frequently is the author of a Peripneumonie.) No remedies that are uſed will do her good without phlebotomie, which continually is ſo very neceſſary, that upon every return of the ſickneſs, in ſpite of all things, we are compelled three or four times to repeat it, and ſometimes oftener: the blood let out in the Superficies hath conſtantly a viſcous and whitiſh filme. This diſeaſe was ever a ſimple Pleuriſie void of a Peripneumonie, and for cure ſhe with conſtant ſucceſs uſed the following method.

Take Spirit of Sal Armoniack diſtilled with Gum Ammoniacum three drams; take from 15 drops to 20, three times a day, with the following Julep.

Take Carduus and Black-Cherry water, of each ſix ounces, Hyſterical Water one dram Sugar 6 drams. Between whiles ſhe took a doſe of this Powder with three ounces of Apozeme.

Take Powder of Crabs-eyes, of a Boars tooth, Sal Prunella of each one dram, make a powder for 6 doſes.

Take Graſs-roots 3 ounces, candied Eringo one ounce, Shavings of Ivory and Hartshorn of each two drams, the Parings of Apples one handful, Raiſins one ounce, boyl them in three pound of Spring-water to two pound, to it ſtrain'd, adde Syrup of Violets one ounce, ſal Prunella one dram, mix them, and make an Apozeme.

Clyſters of Milk with Syrup of Violets were injected, ſometimetimes every, ſometimes every other day. If Opiates, however mild, were given to allay pain, upon it a pain and drouſineſs of the head, and Convulſions did infeſt her moſt grievouſly.

SECT. I. CHAP. X.

Of an Empyema.

An Empyema is the product of other diſeaſes of the breaſt.

IT is clearly manifeſt from what hath been ſaid before, that a Pleuriſie, and Peripneumonie, are diſeaſes not only akin but commutable among themſelves, and ſucceſſive to one another; Moreover, as well this as that, and frequently both together, not being well cured, doe paſs into an Empyema. For when a Phlegmon rais'd about the Pleura is brought to ſuppuration, at length the Impoſthume being broke, the matter falling into the cavity of the Thorax, produces this diſeaſe. In like manner ſometimes it follows from the Lungs being inflamed: inaſmuch as the ichor accumulated about the place affected, turns into a thick and yellow humour by a long digeſtion, which unleſs it be ejected by a Cough, either ſenſibly corrupting the inner ſubſtance of the Lungs, it cauſeth a conſumptive diſpoſition, or diſſolving the unity of the intire Lungs, and at length corroding the outmoſt membrane, it ſlides down into the breaſt, and ſo engenders an Empyema. Any one labouring with an Impoſthume or ulcer of the Lungs, although he do ſpit out abundant and fœtid matter (as it frequently happens in an Impoſthume of the Lungs,) is not therefore accounted obnoxious to an Empyema. For in truth, by the common acceptation of this Term is ſignified a Collection of rotten matter within the cavity of the Thorax, by which the Organs of breathing are oppreſſed: but that rotten matter is wont to have a conflux thither either by a Pleuriſie or Peripneumonie, (and ſometimes perhaps from a Squinancy) brought firſt to ſuppuration and afterwards broke.

It rarely or never begins of it ſelf.

Foraſmuch as an Empyema never begins primarily and of it ſelf, but for the moſt part is the effect or product of other diſeaſes, not duely cured, it will not be requiſite to make much inquiſition about the cauſes thereof. The formal reaſon or conjunct cauſe thereof is known well enough, (to wit) it is a purulent matter, poured out from the Pleura, or the Lungs, or the Larinx, into the cavity of the Thorax. But the other proper cauſes of the previous effects, appertain to the Etiologies of every of them.

What the morbific matter is.

There is a certain diſpute about the morbific matter; for ſome contend that it is meer corruption, others not that, but that it is a purulent matter, of which opinion is *Johannes Heurnius*, who averring a purulent matter for the conjunct cauſe of an Empyema, diſtinguiſhes between this and mere and pure Pus, affirming this to come to paſs *from a bloody nutritious humour*, i. e. *from the blood it ſelf ſomewhat corrupted, but capable of digeſtion, but that a purulent matter is an excrementitious humour*, viz. *a Serum or Ichor*, which proceeds from the blood obſtructed and hindered ſomewhere in its Circulation. From hence we may obſerve concerning an Impoſthume which affords true and laudable *Pus* or matter, that it is for the moſt part compact, every way ſhut up and wrapt up together either in a bladder, or (as it were) within private Apartments, and then after it is maturated and broken, pours out the contained humour, and is ſoon and eaſily healed. But an Impoſthume affording a purulent matter forms its neſt not ſo bound up and encompaſs'd with walls, but for the moſt part unequal and crooked, and being broken rather pours out filthy blood or gore than matter or Pus, and then by reaſon of the ſucceſſive ſource of excrementitious humour, it is very difficultly healed.

The difference of Pus and a purulent matter.

Moreover, we are to conſider, that each humour as well Pus as purulent matter doth ſometimes ſtink notably, and is alſo ſometimes very free from any bad ſavour. Some maturated and broken Impoſthumes pour out fetid matter, others matter without any ſmell. I have often obſerv'd Impoſthumes of the Lungs, as well as Phlegmons of other parts to have this ſeveral diſtinction. Purulent matter from many Ulcers ſtinks ill; the Spittle of conſumptive perſons which is eſteemed to be very dangerous, for the moſt part is without any ſcent. It is uſual where the ſide is opened by reaſon of an Empyema, that at firſt the matter flows out not unſweet, but after two or three days the air having more frequently enter'd into the orifice, it ſtinks moſt horribly: which ſtench notwithſtanding after an injection of ſome aromatical or vinous Spirit vaniſhes again in a ſhort ſpace. But it would be a thing of much te-

Why both ſometimes with, and ſometimes without ſtench.

diouſneſs

diouſneſs to denote the particular reaſons of each of theſe accidents and alterations, for that never ſo little alteration of the Pus or purulent matter, both cauſes and removes the ſtench from them. When the ſulphureous particles are equally digeſted, and being ſubjugated to the ſalts are contained in a mixture, there is no ſtench; but as ſoon as they being looſed begin to fly away, and carry the ſalt particles with them (whereby they are ſharpened) they diſperſe a very bad ſtench round about. But whereas an Injection or Lotion with vinous and aromatical liquors, being ſometimes adminiſtred to a putrid Ulcer or neſt of an Empyema, frequently removes all ſtench; the reaſon is, becauſe the ſides of an Ulcer, no otherwiſe than as a ſtinking pot, infect the contained liquor as with a certain ferment, and ſo impreſſe a ſtink: but when that ferment of the veſſel or bowel is waſhed or overcome by a well-tempered and ſtrong liquor, then that propagation of a ſtench ceaſeth. From hence follows not always an ill ſign, nor is it ſo very good, if the Spittle of conſumptive perſons, and the Impoſthumes of ſuch as are Empyematical are excerned either with, or without ſtench; for that I have known it to have been to ſome healthful, and to others deadly in either caſe. Moreover a more certain Judgment is not to be taken from thence, that the ſpittle of ſome conſumptive perſons floats upon the water, and that of others ſinks.

Neither the cauſe of an Empyema.

But although we do not much diſapprove of that diſtinction of Pus and purulent matter, notwithſtanding we adjudge neither only this, nor always that, to be a conjunct cauſe of an Empyema. Whenas this diſeaſe ſucceeding a ſimple Pleuriſie, ariſes from an Impoſthume being ſuppurated and broken in the ſide, it is moſt commonly pure and meer Pus, which falling into the cavity of the breaſt, engenders that diſeaſe. But if an Empyema be an Offspring of a Peripneumonie (unleſs an Impoſthume of the Lungs intervene) the ichorous matter being accumulated about the place of the phlegmon, and after thickening by meer concoction, it wounds the Lungs, and at length making a hole through the membrane encompaſſing it, and flowing out into the Thorax, produces an Empyema. That matter is rather to be accounted purulent than meer Pus.

The Signs of an Empyema whilſt beginning.

The ſigns of an Empyema either prognoſticate it while it is in *fieri*, or indicate it plainly done. Some foregoing diſeaſes are eſteemed of the former ſort, whoſe iſſue this uſes to be, of which ſort are the Pleuriſie, Peripneumonie, and Squinancy, alſo ſometimes a ſtroke or wound of the breaſt, and ſometimes other diſtempers thereof, not well cured, nor diſcharged; out of which the ſuſpicion will be greater of an Empyema to enſue, if after one or two weeks without abundant Spittle, the ſhivering of an Ague and fainting of the Spirits overtakes one. Then after fourteen or twenty days, there will be ſigns of an Empyema fully made, as difficult breathing, *When perfect.* a heavineſs of the breaſt, a ſwimming to and fro of the matter, and a ſenſe of pain from the poſition of the body chang'd, thirſt and a ſmall feaver almoſt continual, redneſs of the cheeks, diſquietneſs of the whole body, and watching.

An Empyema is diſtinguiſhed many ways, *viz.* Firſt according to the diſtemper going before, whoſe Offspring it is; alſo according to its ſeat, one while in the right ſide of the breaſt, another while in the left, and another while in the whole capacity thereof; and laſtly, as to the morbific matter, which is either meer and laudable pus, or purulent matter, and this one while gentle, and benigne, and another while ſharp and ſtinking.

Prognoſticks of this diſeaſe.

Prognoſticks of this diſeaſe begin as well before as after inciſion; the former determins whether the ſide ought to be opened or not, alſo it preſages of what ſort the event will be, either with or without opening. If an Empyema ſucceeds more ſlow, after the firſt diſtemper, to wit not before the thirtieth or fortieth day, whenas the ſtrength is very much worn, and the Lungs are vitiated, and their ſtructure hurt; and alſo if a feaver remain as it were hectick, the breathing ſhort and painful, the Pulſe weak and quick, with cold ſweat, and with a Diarrhea or waſting looſneſs, and frequent faintings of the Spirits, then the ſtate of ſuch a perſon being evidently deſperate, doth not admit of any opening; let a Phyſician ſuffer him to dye without bleeding, leſt he ſeem to murder him. But if on the contrary, after manifeſt ſigns of an Empyema more maturely perfected, the painfulneſs of the Lungs or ſide, as alſo the feaver and other ſymptomes abate, and the Pulſe, and ſtrength of the Spirits are in vigour, it will be lawfull ſafely to advance to cutting, and thereby to hope a happy ſucceſs. Inciſion being made, if white Pus duly concocted or otherwiſe laudable skip out with eaſe, and thence the heavineſs of the breaſt and difficult breathing

abate, and the patient is better as to the other paſſions, there will not the leaſt doubt remain of his cure: but if no Pus, or that which is bad, if thin, ſomething bloody, or ſtinking, flow from the ſide being opened, we can conceive thereby but ſmall hope of recovery.

What it ſignifies when the Probe is guilded by the Empyematical matter.

Hippocrates among the preſaging ſigns of a mortal Empyema, recounts that of the Probes being coloured by the Pus, as by fire; or what we often obſerve, and ſometimes without any evil event, if the ſilver Probe being put into the orifice of the open'd ſide, be preſently ting'd with a colour as it were of Gold or Copper; which ſurely ſignifies no other thing but that the ſulphureous particles of the pus, or purulent matter are ſo exalted, and looſen'd from the bond of mixture, that eaſily departing they may be affix'd to any other body, and eſpecially ſilver, whereunto they are akin. Sometimes I have ſeen Veniſon kill'd by long and weariſome hunting, preſently bak'd in an Oven for Entertainment, become not only moſt tender, inſomuch that it might be taken out with Spoons, but even to have guilded a bright ſilver Spoon at the firſt touch. The reaſon whereof is the ſame with the former; *viz.* that the fleſh was ſo diſpoſed to putrefaction by too much exerciſe while the animal lived, that the particles of the Sulphur being exempt from Concretion, and apt to fly away, preſently adhere to any other fit ſubject: But this by the by.

The cure of the diſeaſe.

As to what belongs to the curatory part of an Empyema, we ought chiefly to conſider whether the ſigns of this diſeaſe, as being now perfected, be certain, or doubtfull. In the former caſe there will not be much need of Medicine, but the body only being prepar'd before-hand, we may immediately proceed to the opening of the ſide. Wherefore, if from a Pleuriſie or Peripneumonie not rightly cur'd, or from blood poured out after a ſtroke, fall, or inward wound, a fluctuation of Pus or purulent matter, or bloody within the cavity of the Thorax, be perceived, with no Spittle, or with little, there will not be need that we dwell longer on maturing or expectorating Medicines, but the belly being looſened, and the blood and humours rightly temperated by Juleps, Apozemes and Anodynes, either that a bare Section be ordained; or that in tender and fearful perſons a Cautery be applyed between the 6th and 7th Vertebra, and after the Eſchar is rais'd, the Inciſion-knife be obliquely forc'd by little and little, towards the hinder and upper part, untill it penetrate into the very Cavity of the Thorax; afterwards, a little ſilver Pipe being put in, let the contained matter be ſent out by degrees; notwithſtanding in ſuch manner that, if his ſtrength will bear, an evacuation of the whole humour be accelerated; for a portion thereof being left within, often contracts a hideous ſtench, within a few days (by reaſon of the Air, as is aboveſaid, being admitted) which evil, that it may be provided againſt, or ſoon removed, a vulnerary and abſterſive liquor is to be caſt in twice or thrice a day by a Syphon or Syringe. It will not be requiſite to preſcribe particularly the other things belonging to this operation, and the proceſs thereof; for that each of theſe things are evidently known to any of the more expert Chirurgeons, and are uſed in familiar practice. After inciſion and the appertaining adminiſtrations rightly performed, there will not be much beſides left for a Phyſician to doe. It is convenient there be a right courſe of Diet, a frequent looſening the belly (as often as need ſhall be) by Clyſters; and moreover it behoveth us to preſcribe remedies vulgarly called Vulnerary, which hinder the diſſolution of blood, and the profuſion thereof into ſeroſities injurious to the breaſt.

The cutting or opening the ſide.

The Empyematical matter is wont to ſtink by the often admiſſion of the Aire.

Thoſe things which perſwade or forbid a Paracenteſis.

But if the Signs of this Diſeaſe be leſs certain, and (as for the moſt part it is wont to be, from a Peripneumonie and Impoſthume of the Lungs going before) altogether doubtfull, Inciſion muſt not too ſoon or raſhly be made. For I have known ſome ſpitting forth a purulent matter, yea a fetid Pus, with painfull breathing, and heavineſs of the breaſt, to have undergone a Paracenteſis in vain, and not altogether exempt from hurt. Wherefore, until it is apparent by pathognomic ſigns that it is an Empyema confirm'd, expectorating medicines (as are before preſcribed for the cure of a Peripneumonie) as alſo things gently moving evacuation by Urine and Sweat, may be uſed for ſome time: But theſe availing nothing, and the Empyema ſtill remaining or increaſing, (becauſe whileſt there is ſtrength it is better to try doubtful Medicines than none) proceed to a Paracenteſis.

Forms of Remedies.

As to the Forms of Medicines requiſite to the curing an Empyema, before Inciſion, the ſame remedies that are preſcribed in a Peripneumonie are convenient; but the Paracenteſis being made, theſe following will be chiefly in uſe.

Againſt fainting of the Spirits, and ſwoonings which happen in that operation, or afterwards,

afterwards, let the following Julep be at hand to be taken now and then about four or five ſpoonfuls.

Take Balm and Black-cherry water, of each ſix ounces, Aq. Mirabilis one ounce, powder of Pearle one dram, ſyrup of Gilliflowers one ounce. Mingle for a Julep. *Cardiacs.*

The following Decoction to be drunk three or four times a day.

Take of Harts-tongue, Speed-well, Agrimony, Colts-foot, Mouſear, Sanicle, of each one handful, Madder and Chervil-roots of each one ounce, Barly half an ounce, red Cicers half an ounce, Raiſins an ounce and half, boyl them in four pound of Spring-water to half, ſweeten it with clarified Honey, or with Syrup of Mouſe-ear as you take it, to your pleaſure. If a Feaver be wanting, the following Pills may be taken from one ſcruple to half a dram, Evening and Morning. *A Vulnerary Decoction.*

Take powder of Crabs-eyes two drams, Flower of Sulphur one dram, Sal Prunella half a dram, Spec. Diarrhodon Abbatis one ſcruple, Venice-Turpentine waſhed, make a maſs formed into ſmall Pills, or omitting the Turpentine take the powder from half an ounce to two ſcruples, twice in a day.

Examples of perſons ſick of an Empyema are not ſo frequent, and thoſe cured of that Diſtemper more ſeldom. I have known two, unwilling to admit of an Inciſion preſcribed by all means by the Phyſicians, to have fatally expired, and their dead bodyes I have diſſected. Alſo I ſaw that operation adminiſtred to two others, whereof one recovered health, the other dyed conſumptive; but the reaſon thereof was, his Lungs being notably corrupted, and his ſtrength utterly loſt, the too late opening his ſide conferr'd no help to him; but did much depreſs his ſpirits, weak enough before, and waſted his ſtrength. He whoſe ſide was opened, had Lungs ſound enough; but from the Impoſthume of the ſide being broke inwardly, the matter falling into the cavity of the Thorax did ſo compreſs the Diaphragma that he could ſcarcely breathe. The Chirurgeon without a Cauſtick thruſt in his Inciſion-knife between the 6th and 7th Vertebra, and having made a hole quite through his fleſh, he put in his Pipe. A bloody ichor firſt flowed out, afterwards being drawn away by a moderate quantity at times for three dayes, it flowed out without any ſtench; but afterwards as often as the Orifice was opened, a moſt horrid ſmell came forth, exceeding the ſtench of any Jakes, though ne're ſo ſtinking, and infected the whole Chamber with the ill ſcent: Moreover it remain'd ſo for many days, untill by injections made of Myrrh and bitter herbs, boyl'd in Water and Wine, and very often adminiſtred every day, at length it was extinguiſhed; by the daily uſe of which, the morbific matter and at length all the ſordidneſs being waſhed away, all flowing out ceaſed; and laſt of all the Orifice being cloſed, the patient recovered his entire health. I diſſected the dead bodies of thoſe who dyed, when by no perſwaſion of Phyſician or Friends they would admit of the opening of their ſide. One I have ſpoke of otherwhere, the reſult whereof was, the Pus ſtreaming from the Impoſthume raiſed in the Pleura, and in the intercoſtal Muſcles, and broken internally, had waſted part of the affected place, and of the contiguous Lung, with a Sphacelus or Gangrene, and ſo corroding the Diaphragma, and a hole being made on the right ſide thereof, it had deſcended into the Viſcera or bowels of the lower belly: and there in the whole paſſage of the Ventricle and Inteſtines, the outer Coats on which the purulent matter had fallen, appeared eaten and diſcoloured; and at length the purulent matter corroding and boring through the *inteſtinum rectum*, it came forth through the fundament together with his excrement. The ſick man being ſtrong and impatient of any medicine, endured the tyranny hereof for about two months, but in the mean while he lived miſerably, afflicted with a light Feaver, thirſt, inquietude, pain of the ſtomack, and frequent tumbling up and down, and almoſt with continual watchings. His body being opened after his deceaſe, a moſt horrid ſtench, exceeding any Jakes, diffuſed it ſelf throughout the whole Chamber. The Anatomy of another who dyed by an Empyema, afforded not ſo vaſt an effuſion of purulent matter. This indeed had its neſt in his ſide, from whence falling into the cavity of the Thorax, and there accumulated in a vaſt heap, and continually defiling his Lungs drenched therein, it cauſed a ſlow and as it were a hectick Feaver, whereby the patient, being very old, dyed.

An Hiſtory of one troubled with an Empyema, the cutting of whom was mortal.

Of another who recovered by that remedy.

The Hiſtory of one who dyed becauſe he was not cut.

A fourth Hiſtory like the former.

SECT.

SECT. I. CHAP. XI.

Of an Impoſthume of the Lungs.

Vomica Pulmonis a diſeaſe ſeldom obſerv'd.

A *Vomica* of the Lungs is ſomething a-kin to an Empyema or Peripneumonie, conſidering that the morbific matter is always meer Pus, which notwithſtanding is generated in the Lungs without a Feaver and Phlegmon, yea without any great Cough or Spittle, as it were ſilently, and without noiſe; and frequently this evil doth not diſcover it ſelf before it kills the patient. *Galen* makes mention of this in *lib.* 1. *de locis affectis*; but among Authors who have written Syſtemes and the practical parts of Phyſick, mention thereof is ſeldom or ſcarce to be met with. *Tulpius* in *lib.* 2. *chap.* 10. deſcribes this diſtemper after this ſort. *This evil* (meaning an Impoſthume of the Lungs) *lurks in the beginning ſo ſecretly that it ſcarce diſcovers any ſigns of it ſelf, beſides, in the firſt place, a little dry Cough, and preſently moiſt; which continuing for ſome time, the breath is drawn with difficulty, the ſpirit fails, and the body withers by degrees, although in the mean time the Spittle makes no ſhew either of pus or blood; and if the Impoſthume break by way of ſurpriſal, the man is kill'd immediately.* It is wont ſometimes ſo to happen, but I have known many who in an Impoſthume riſing inſenſibly, being maturated, and at length breaking, have ſpit up great plenty of fetid corruption; and though with voiding daily ſuch a Spittle, for many weeks, nay months, they became very weak, and as it were conſumptive, yet at length by the help of Medicines, after the Ulcer hath been mundified, and dryed, they have recovered their health entirely.

The formal reaſon and conjunct cauſe thereof.

This diſeaſe, if we ſearch into the formal reaſon and conjunct cauſe thereof, is in truth a concourſe of ill humours gathered in ſome part of the Lungs; whoſe matter although it be heterogene and an enemy to nature, notwithſtanding from the beginning appears not ſharp, or irritative. For when at firſt being ſeparated from the blood, it is depoſited in ſome hollow place of the Lungs, perhaps in ſome bladdery cell, it doth neither raiſe a Cough nor produce a Feaver; but afterwards when ſenſibly encreaſed it compreſſes the neighbouring Veſſels bringing blood, and moreover inſinuates into the very blood paſſing by, incongruous Effluviums; from thence a ſmall Feaver ſucceeds, with a certain diſquietude, and feebleneſs; and at length being accumulated to its fulneſs, and maturated by a long digeſtion into mere pus; breaking its neſt very much diſtended before, it flows out every where all about. But if the ways are not open for the iſſuing of the pus, it incontinently mingles it ſelf with the blood, and either empoyſons it, or impedes it from Circulation; or ruſhing by heaps into the Tracheal paſſages, it doth fill moſt of them at once, and ſo ſtuffs them, that a ſufficient entrance is denyed to air to kindle the blood, and preſently the vital flame expires: but if this matter find paſſage, and flow by degrees into the Trachea, from whence again it may be preſently carryed away, and ſpit out, there will be then ſome truce of life, with hope and opportunity of cure. And indeed I have known many cur'd of this diſeaſe.

The morbifick matter.

The uſual matter of an Impoſthume of the Lungs is meer Pus, which often ſtinks notably, and by that differs from the Spittle which is ejected in a Peripneumonie or a Conſumption of the Lungs. But whence that matter proceeds in the beginning thereof, and of what diſpoſition it was before it was ripened into pus, I cannot ſo eaſily determine: becauſe the ſeeds of this diſeaſe being privily ſow'd, and growing up ſecretly, ſpring wholly from an occult original; wherefore its procatarctick or more remote cauſes lye conceal'd, yea while it begins and increaſes, can neither be diſcovered by any pathognomical Signs, nor can any prognoſtick be deviſed, before it diſcovers it ſelf with a mortal ſtroak, but the whole procedure thereof is treacherous.

Now if after the Impoſthume is broke, and the ſpitting up of pus with an eaſie diſcharge being begun, with a conſtancy of ſtrength, there be means offer'd for ſome method of cure, the chief Indications according to the common cuſtom in moſt diſeaſes will be theſe, *viz.* Curatory, preſervatory, and vital. The firſt commands the matter of the Impoſthume ſpeedily to be diſcharg'd by Spittle, and that the ſides thereof ſhould be cleanſed and healed as much as is poſſible. The ſecond Indication

dication provides againſt the conflux of new matter to that neſt, or other adjoyning places of the Lungs (whence a Conſumption may be engendred). The third reſtores the languiſhing of the Spirits, the loſt ſtrength, and the fruſtrated Nouriſhment.

1. As to the firſt Indication, remedies commonly called expectorating, and of them thoſe that are more hot and ſharp, and do very much cleanſe and drye, but eſpecially (for that for the moſt part here a Feaver is wanting) ſulphureous remedies are expedient; which alſo may be preſcribed according to the following forms. *First Indication.*

Take of Tincture of Sulphur three drams, take from ſeven drops to twenty, at bed-time, and early in the morning in a ſpoonfull of Syrup of the Juice of Ground-Ivie. Or, *Forms of Remedies.*

Take our ſyrup of Sulphur, as before ſet down, 6 ounces, let a ſpoonfull be taken at the ſame hours.

Take the dried leaves of Ground-Ivy, Germander, white Maiden-hair, Coltsfoot, Hyſſop, white Hore-hound, Savory, of each one handful, Enula-campane, Orris, and Chervil-roots, of each one ounce, Anniſeeds half an ounce, boyl them in 6 pound of Spring-water to three pound and a half, adding towards the end White-wine 6 ounces, clarified Honey three ounces. Let the ſtrained Liquor be clarified, and kept for uſe: the doſe 6 ounces warm, three times a day. Or,

Take of Lime-water 6 pound, put it in a Glaſs with a large mouth, hanging in it the following bag:

Take the dried leaves of Germander, Ground-Ivy, white Horehound, of each one handful, Orris and Enula-campane ſliced one ounce and a half, Anniſeeds bruiſed two ounces, Liquoriſh an ounce and half, Raiſins ſtoned three ounces, let them be ſtopt and ſtand cold. Pour out for uſe, the bag remaining.

Take Lohoch Sanum three ounces, Species Diaireos two drams and a half, flower of Sulphur one dram and a half, of ſimple Oxymel two ounces, make a Linctus to be licks with a Liquoriſh-ſtick.

Take the powder of Hedge-muſtard, Ground-Ivy, of each half an ounce, flower of Sulphur a dram and a half, ſyrup of Sulphur (or of the juice of Ground-Ivy) what will ſuffice to make a Lohoch.

Take of fine Mirrh, of white Amber, of each half an ounce, Sulphur Vivum, Auripigment, of each two drams, the rinds of Piſtaches one dram and a half, make a powder for Fumigation, to be uſed in a Paper-funnel, morning and evening.

2. The preſervatory Indication, aboliſhing the morbific matter, and ſo providing againſt a Phthiſis prone to ſucceed; endeavors the purifying of the blood, and ſtrengthning the Lungs, to which ends, Purgers, Vulnerarie Decoctions, diſtill'd waters and phyſical Drinks, are convenient. *Second Indication.*

Take of the Decoction of Senna of Gereon (with one dram and half of Agarick) three ounces and a half, purging ſyrup of Apples one ounce, Aq. Mirabilis two drams, make a potion to be taken with government once in a week.

The form of the Wound-drink let be the ſame as was preſcribed for an Empyema after opening, or 4 or 6 ounces of the Decoction common in Shops, three times a day, (becauſe here is no feaver.)

Take of Firre-tops 6 M. freſh Ground-Ivy, Hyſſop, Sage, Rockets, Hedge Muſtard, St. Barbaries *herb or Winter-creſſes, of each four handfuls, the ſeeds of the Sun-flower 6 ounces, ſweet Fennel-ſeeds two ounces, Enula-campane, Orris-roots, of each 3 ounces, being cut and bruiſed, pour upon them 8 pound of* Brunſwick *Mum or Spruce-Beer, diſtill it in a cold Still, let the liquor be all mixt, and when uſed, ſweetned at pleaſure with ſyrup of the juice of Ground-Ivy; the doſe three or four ounces, three times a day.*

Take of the roots of Sarſaparilla ſix ounces, China two ounces, of each of the Sanders ſix drams, Shavings of Ivory and Hartshorn, of each half an ounce, Maſtick-wood one ounce, being cut and bruiſed infuſe them in 12 pound of Spring-water, boyl them to half, adding one ounce of Liquoriſh, Raiſins 4 ounces, let the ſtrained liquor be kept for ordinary drink.

3. The vital Indication preſcribes Cordials, Anodynes, and a convenient courſe of diet. The ſame forms of Medicines for the moſt part are expedient here; which were *Third Indication.*

pre-

preſcrib'd for an Empyema after inciſion, and alſo the ſame diet as was ordain'd in a beginning conſumption; beſides, in this caſe Aſſes-milk often-times doth much good. As to the curing this diſeaſe, I have obſerved, that an Iſſue made in the ſide, for the moſt part doth ſignally profit. I remember two ſuffering under this diſtemper, by coughing up plentifully mere ſtinking Pus or Corruption after the Impoſthume broke, to have been heal'd by this Remedy in a ſhort ſpace of time. The Hiſtories of the Cures ſhall be afterwards annexed. In both theſe by a ſhallow orifice made in the ſide by inciſion, meer Pus began within three or four days to flow out, and then the Spittle began to be abated; and after that flowing, encreaſed from day to day, for ſome time continued, the Spittle altogether ceaſed, and the Patent recovered his entire health.

Fontinels in the ſide very often greatly help in this diſeaſe.

The reaſon of this admirable Effect ſeems to be, that the part affected of the Lungs, or that which is bordering upon it, while the diſeaſe was ariſing, or before, grew to the very ſide, and therefore Nature had endeavoured by this way the thruſting forth of the Pus or matter contained in the Impoſthume; and for that cauſe perhaps had made ſecret paſſages even to the ſuperficies of the ſide; wherefore, afterwards an iſſue being laid open by a knife, the excretion of the morbific matter was conducted thither. It is alſo probable, that a certain part of the Lobe of the Lungs at firſt grew to the ſide in the diſeaſed, and by reaſon of the cleaving thereto, afterwards the Impoſthume had its riſe; for whereas that part being almoſt immoveable, could not be ſtirred like to the other parts of the Lungs, the morbific matter was depoſited there, and was the better able to reſide or form its neſt there.

Although the Impoſthume of the Lungs be thought a very rare diſtemper with ſome Phyſicians, and by *Tulpius* judg'd ſo mortal, that when it breaks it kills out-right; yet I have known many to have labour'd under this diſeaſe, and by the help of Medicines to have recovered their priſtine health. We may here deſcribe two or three of the more remarkable Hiſtories of them.

A Gentleman of a middle age, and before ſtrong and continually healthful, finding himſelf not well, without any apparent cauſe, contracted as it were a crazie diſpoſition; for being without pain, without Vomit, Cough or notable Feaver, in a ſhort time grown weak, he became without any appetite, unapt to ſleep, full of thirſt and hot about the precordia; this perſon was handled a long while by ſome Phyſicians as Scorbutical, and by others as hectical; and after various methods of healing were aſſay'd in vain, at length the diſeaſe ſallying out as from an ambuſh, appeared manifeſtly. For whilſt on a certain night being more unquiet than uſual, he toſſed himſelf very much in his bed, all on a ſudden the Impoſthume breaking in his Lungs, a large quantity of ſtinking pus was thrown out by Cough, ſo that in four or five hours he threw off about two pints. Moreover, after his Cough continuing about two months, he daily ſpit out purulent matter, thick and very ſtinking, untill his fleſh being conſumed, and he wholly ſpent, was reduced to languiſhing, and a notable Conſumption. From the ſtench of his Spittle and breath the whole Chamber was ſo filled, that his Servants or thoſe attending him, could not endure the ill ſcent thereof.

After the Impoſthume was thus broken, I and two other well-known Phyſicians being adviſed with, with all circumſpection we preſcribed Medicines to abſterge and heal the Impoſthume, and to cleanſe the Blood and Lungs, and to redeem him from an imminent Conſumption. *A Tincture, and ſyrup of Sulphur, together with Pectoral and Vulnerary Decoctions and Diſtillations were taken; alſo Lohochs and balſamick Pills, day after day in a conſtant courſe, with Clyſters, gentle Purgatives and Diuretick, were taken between whiles:* then theſe, *Vaporations and Fumigations, as well ſulphureous as arſenical, were uſed morning and evening.* After theſe things being long and carefully uſed did help nothing, I often propounded the opening of the Thorax; but the ſick man obſtinately rejecting this operation, ſaid he would rather dye than be murdered; yet at length, when I aſſured him that this remedy, or none, was further to be attempted, he began to deliberate with himſelf, and immediately baring his breaſt, he ſuffered me to ſearch a place where I might apply a Cauterie; the buſineſs was preſently put out of doubt, for a Tumour appeared on the left ſide of the Sternon, between the 5th and 6th Vertebra. Inſtead of a Cautery, I applyed thereto a ſuppurating Plaiſter, and within three dayes the top of that ſwelling became red and ſoft: out of which, being the next day opened, firſt a thin ichor, and a little after a yellow and concocted pus flowed out, and afterwards it continued daily to ſtream out more plentifully: from that

that time his ſtinking Spittle began to abate, and within fourteen days it ceaſed quite; the morbific matter obtaining through that orifice both an eaſie and more convenient iſſue. Although by the effect it was manifeſt, that the paſſage of that orifice lay open into the breaſt, and perhaps into the middle of the Lungs, yet no liquor caſt in by a Syringe, could either penetrate or be forced in thither: ſo ſecret and intricate are the conveyances which Nature forms for her laſt aids; that by the ſame paſſage by which the morbific matter is exterminated, nothing more hurtful can enter. This opening of the ſide was at length chang'd into an Iſſue, and a Peaſe or a wooden pill being put in, there came forth daily for half a year together plentifull ichor; and in the mean time this well-known perſon, all corruption of the breaſt being ſhook off, and the fleſhy habit of his body being recovered, became healthful in all reſpects, and laſtly, that iſſue being removed to his arm, he bears no ſign of that nor any other diſeaſe in his breaſt.

After this Cure ſo by chance accompliſhed, it hapned I performed another like it, on purpoſe, not leſs ſucceſſefully; for ſhortly I was ſent for to a noble Lady which had been for many years obnoxious to the heat of the precordia with a Cough. One day, when ſhe coughed ſhe was throughly ſenſible of ſomething broke in her Lungs, and preſently ſhe voided abundance of meer pus, and that ſtinking; after that, this kind of Spittle continuing with a Cough, for a week, notwithſtanding the uſe of remedies, ſeemed rather augmented than diminiſhed, I adviſed to have an Iſſue cut in her ſide, near the very place whence ſhe perceived the pus to aſcend, which ſhe readily granted: Within three days, from the orifice being opened meer pus began to flow out, like that ſhe diſcharged by Cough. Then after the morbific matter had iſſued out by that Fontinel, both the Cough and the ſpitting of pus wholly ceaſed, and within a Fortnight the patient recovered her firm health.

After this I was ſent for to another, *viz.* a ſtrong man, and as ſtrong a drinker; who being affected with an Impoſthume of the Lungs, alſo ſpit up an abundance of pus and very ſtinking matter. This Patient by a certain rude contumacy abhorr'd any iſſue, wherefore he would not ſuffer any to be made in his ſide; notwithſtanding he took any Medicines offered to him, by a long uſe of which Remedies he eſcaped free from that diſeaſe: the Medicines whereby he chiefly received help were prepared of Sulphur, as our Syrup and Tincture, taken daily and very frequently. To theſe for Vehicles were added one while a Decoction, another while a pectoral Hydromel, another while Lime-water, with an infuſion of pectoral, as well as vulnerary Ingredients. Moreover Fumigations and Smokes, eſpecially of ſulphureous and arſenical Ingredients, did contribute very notable help.

SECT. I. CHAP. XII.

Of an Aſthma.

An Aſthma a moſt terrible diſeaſe.

AMong the Diſeaſes whereby the Region of the breaſt is wont to be infeſted, if you regard their tyranny and cruelty, an Aſthma (which ſometimes by reaſon of a peculiar ſymptome is denominated likewiſe an Orthopnœa) doth not deſerve the laſt place; for there is ſcarce any thing more ſharp and terrible than the fits hereof; the organs of breathing, and the precordia themſelves, which are the foundations and Pillars of Life, are ſhaken by this diſeaſe, as by an Earthquake, and ſo totter, that nothing leſs than the ruiné of the whole animal Fabrick ſeems to be threatned; for breathing, whereby we chiefly live, is very much hindred by the aſſault of this diſeaſe, and is in danger, or runs the riſque of being quite taken away.

An Aſthma is denominated from ἀᾶμάινειν, (which is to breath purſie, or difficultly) and may have this deſcription, that it is a difficult, frequent, and purſie breathing, with a great ſhaking of the breaſt, and for the moſt part without any Feaver.

The cauſes of reſpiration hurt.

The act of breathing depends as well on moving the Lungs, the Structure whereof ought to be of that ſort that its paſſages, and all the pores may perpetually be open, for the free ſucking in and letting out air; as from the parts or organs moving them, which by alternate turns of Syſtole and Diaſtole, do cauſe the hollowneſs of the breaſt, and conſequently the Lungs themſelves to be dilated, and contracted: whereas therefore there are many and divers reaſons of diſturbance, whereby reſpiration is prejudiced, for the moſt part they may all be reduced to theſe two heads; *viz.* that there is a fault either in moving the Lungs, or in the parts or inſtruments that ought to move them, and from hence the differences and kinds of this diſeaſe are beſt of all deſign'd; for according to the various nature and poſition of the morbific cauſe, it is called an Aſthma, either meerly pneumonick, proceeding altogether from the paſſages bringing in aire being obſtructed, or not enough open; or it is meerly convulſive, which only ariſes by reaſon of a defect or fault in the motive organs; or mixt, when either parts conſpire in the fault, which origine every great and inveterate Aſthma is wont to have; of each of theſe we will treat in order.

The Ancients allowed the cauſe of it only from the Bronchia obſtructed:

1. The ancient Phyſicians, and for the moſt part hitherto the Moderns have only acknowledged the firſt kind of Aſthma, judging the next cauſe, and almoſt the only cauſe of this Diſeaſe, to be the ſtraitneſs of the Bronchia, *viz.* inaſmuch as the ſpaces of thoſe paſſages, being either ſtraitned together by obſtruction, or compreſſion, as often as the uſe of breathing is required, do not admit of plenty enough of Aire, wherefore, for the more free inſpiration of aire, as ſhall be needfull, the organs of breathing do moſt difficultly labour, with throes moſt frequently repeated.

Or vapours from the Spleen or Womb, but erroneouſly.

But that ſome are found obnoxious to fits of an Aſthma, without manifeſt taint of the Lungs, it was wont to be aſcribed to vapours from the Spleen, Womb, Meſentery, or ſome other bowel, undeſervedly enough; but ſurely that paſſion, without the ſtraitneſs of the Bronchia, or fault of thoſe bowels we have in another place ſufficiently evidenced to ariſe from Cramps of the moving parts, and ſhall be preſently clearly made out. But in the mean time by what means it may ariſe alſo from the paſſages of the Trachea obſtructed, or compreſſed, it lyes upon me to declare.

After what manner the ſtraitneſs of the Bronchia ariſes.

The ſtraitneſs of the Bronchia, inducing the firſt kind of an Aſthma, is ſuppoſed to come to paſs by an obſtruction, as often as either thick humours and viſcous, or purulent matter or blood extravaſated, are forced in upon them; or that little ſwellings, or Schirrus's, or little Stones, ſtop up their paſſages; or finally that a Catarrh of a ſerous humour ſuddenly diſtills upon them. Moreover the ſame diſtemper is thought to be raiſed by compreſſion, as often as matter of that kind (and of every kind of them) ſhall cleave to the paſſages of the pneumonic Arterie or vein. Surely, an aſthmatical diſpoſition depends upon theſe various cauſes and manners of diſturbance: but all invaſions of the diſeaſe, or at leaſt the greater fits are uſually provoked by reaſon of ſome accidents or occaſions. For while the ſtream of blood ſliding and running down gently can be content with a ſmall breathing, it paſſes through the precordia without great labour either of Lungs or Breaſt. But being boyling and

paſſing

paſſing through the Lungs more impetuouſly, it requires a more full inſpiration of aire; for the freer admittance of this through ſtrait paſſages preſently all the breathing organs are alarmed into moſt frequent throes. Whatſoever therefore makes the blood to boyl, or raiſes it into an efferveſcence, as violent motion of the body or minde, exceſs of extern cold or heat, the drinking of Wine, Venery, yea ſometimes mere heat of the Bed doth cauſe aſthmatical aſſaults to ſuch as are prediſpoſed. It is uſual that thoſe who are obnoxious to this diſeaſe oftentimes dare not enter into a Bed, only ſleep in a Chair, or on a bed, being covered with garments. The reaſon whereof is, that the body covered and heated with bed-cloaths, the blood being a little raiſed into a more quick motion, and grown hot, requires a more plentifull ſucking in of air than may be ſupplyed from the paſſages of the Trachea being ſtraitned: for the more blood paſſes the Lungs each Syſtole and Diaſtole, by ſo much, for the enkindling and eventilation thereof, the air ought to be more plentifully and quickly brought in, and ſent forth: to which task (when by reaſon of impediments it is not eaſily diſpatched) yet in ſome manner to be performed, the ultimate endeavors of all the parts appointed for breathing are made uſe of with a great contention of the whole breaſt. Moreover the blood being ſtirr'd, is not only an occaſion, but alſo in ſome part a cauſe in thoſe that are aſthmatically prediſpoſed; for the veſſels bringing blood being thereby more fill'd and diſtended within the lungs, compreſs the Tracheal paſſages being already very ſtrait, and render them much more cloſe.

Whatever cauſes an efferveſcence of the blood is the evident cauſe of an Aſthma.

Why Aſthmatical Perſons are worſe in bed.

II. A convulſive Aſthma (which we judged to be the ſecond kind of this diſeaſe, and to be raiſed without any great obſtruction or compreſſion of the Bronchia, from the mere Cramps of the moving fibres) is not limited to one place, or to any peculiar organ, but being of a diffuſed energy, it is extended to almoſt all the parts employed in breathing (whereof one while this, another while that, or ſome other is in fault.) For a convulſive affection inciting an Aſthmatical invaſion, hath regard to the moving fibres of the veſſels of the Lungs, to the Diaphragma, to the muſcles of the breaſt, to the Nerves, which belong unto the Breaſt, or Lungs, nay to the origine of thoſe Nerves planted within the Brain; and whileſt the morbific matter dwells in every of theſe places, hindering or perverting the work of breathing, it brings on the fits of this Diſeaſe, as in another Tract we have ſomewhile ſince plainly demonſtrated. For the animal Spirits deſtin'd to the function of breathing, if at any time they are very much moleſted and conſtrained into irregular motions, enter inordinately into the Fibres as well nervous as moving of the organs of breathing, and make them for that cauſe one while to be contracted, another while to be diſtended irregularly, as alſo their ſolemn and equal turns of Syſtole and Diaſtole to be variouſly diſturbed or hindered.

A convulſive Aſthma.

Its Seat manifold and diffuſed.

The morbific cauſe or matter provoking the Spirits prepared for the pneumonic work, as in divers places, ſo chiefly in theſe three, is wont to advance its force or power, *viz.* 1. Either in the muſcular fibres themſelves, or 2. In the branches or nervous ſlips, or laſtly within the Brain by the origine of the Nerves.

The morbific matter conſiſts in ſeveral places.

1. As to the former, the heterogene matter being inimical to the Spirits is ſometimes ſhaken off from the Brain into the trunks of the Nerves, and from thence by their paſſages and ſlips, if perhaps it ſhall be in very little quantity, without very great or ſenſible hurt ſlides down to their lower ends. And when it falls in the nervous fibres, and being heaped up daily, ſhall at length ſenſibly increaſe unto a great quantity, it begins to trouble the inmate Spirits, and to provoke them into aſthmatical Convulſions; which forthwith infeſt, and are encreaſed by reaſon of evident cauſes; neither do they utterly ceaſe, untill the ſtock of matter ſo accumulated, be wholly diſpers'd, and conſumed; afterwards when it being renewed ariſes to a fulneſs, the fits of that diſeaſe return, and are for that cauſe moſt frequently periodical, as is manifeſt to common obſervation. According to this account we do deſervedly ſuſpect the cauſe of a convulſive aſthma ſometimes to lurk in the muſcular coats of the pneumonick veſſels, alſo ſometimes in the fibres of the Diaphragma, or the Proceſſes thereof towards the loyns. It is not very probable that the neſt of this diſeaſe conſiſts within the fibres of this or that pectoral muſcle, although in Scorbutical perſons from theſe alſo poſſeſſed with a convulſive matter, we have known pains to have riſen with breathing being hurt.

1. In the muſcular fibres.

2. But truly (even as in another place we have not only demonſtrated by reaſon, but by the obſervations and Hiſtories of the ſick) a convulſive aſthma is often incurred, as often as the morbific matter ſliding down into the pneumonic Nerves, ſticks in

2. Within the Nerves and their enfoldings.

ſome place within their paſſages, and eſpecially about their foldings: whence as often as it is accumulated to a plenitude it begins to be mov'd and ſhaken; wherefore the ſpirits lying lurking, and flowing into the organs of breathing diſturbed, are forced into irregularity, and thoſe ſpirits preſently affect other inmates of the fibres of the Lungs and breaſt, and provoke them into unequal and aſthmatical convulſions. For this cauſe and the reaſon of the diſturbance, we have declared that not only invaſions of this diſeaſe, but alſo the precordia being diſturb'd thereby the Cardiack paſſions do ariſe.

3. Near the Originesof the Nerves.

3. We have clearly unfolded by anatomical obſervations that the cauſe of a convulſive Aſthma ſometimes conſiſts in the hinder part of the head near the origines of the nerves. Surely I have obſerv'd ſome patients, who when, lying ſick of other deſperate diſeaſes, they were alſo aſthmatick, found it neceſſary to be whether in bed or chair with their head always erect, or looking down, but lying on their back or leaning backwards incontinently they gaped for breath as if they were dying, and hardly breathed; the cauſe whereof (as appear'd by diſſection after they were dead)was only a huge collection of ſharp Serum which was gather'd within the cavities of the brain; which,if by reaſon of the head inclining backwards,it fell into the origine of theNerves of the eighth pair,preſently the precordia,and chiefly the breathing organs were affected with horrid cramps. Moreover ſometimes for this very reaſon it ſeems that Orthopnoick perſons cannot lie down in their bed without danger of choaking, but are conſtrain'd to ſit up with an erect body.

3. A mixt Aſthma or partly Pneumonic and partly Convulſive.

III. Although an Aſthma is ſometimes ſimple from the beginning,*viz.* either merely pneumonical, or convulſive, notwithſtanding after either diſeaſe hath for ſome time encreaſed, for the moſt part it gains the other to it ſelf: hence it may be concluded every inveterate Aſthma to be a mixt affection, ſtirr'd up by the default partly of the Lungs ill fram'd, and partly by default of the Nerves and nervous fibres appertaining to the breathing parts. For when the pneumonic paſſages being ſtraitned or obſtructed from ſome cauſe, do not admit of a free ſucking in, and breathing out of the air, for that cauſe alſo the blood, yea and nervous humour, being hindred in their courſes, and compell'd to proceed ſlowly and to ſtagnate, do faſten their feculency and dregs upon the nervous parts; whence the paſſages of the ſpirits are obſtructed, or perverted, and at length a convulſive taint accrues to them. Moreover the blood, being not duly inſpir'd and eventilated within the precordia, at length being vitiated in its temperament ſupplies the brain and nervous ſtock but with a depraved juice, whoſe faults do chiefly puniſh the organs of reſpiration before hurt and debilitated. In like manner alſo the evil is reciprocrated on the contrary part, as oft as this diſeaſe begins by fault of the nervous ſtock; for as much as the motion of the Lungs is often ſtopt or hindered, by reaſon of Convulſions in the muſcular fibres, both the blood and the nervous juice being reſtrain'd from their uſual motions, do heap up dregs and filths, faſtening them to the parts containing them,by which not only viſcous humours and obſtructing of the paſſages, but even Tumours and other more ſolid concretes vitiating the ſtructure of the Lungs, are produced.

The cauſes of an Aſthma recited.

Therefore if when an Aſthma being for ſome time confirmed and become habitual, ſhall attain to frequent fits, and thoſe emergent upon every occaſion; the conjunct cauſe thereof, and alſo the procuring cauſe is placed as well inwardly in the lung it ſelf, as outwardly in the Fibres and Nerves, and in the ſpirits imploy'd for the function of breathing. Neither will it be difficult, by ſeeking diligently each of theſe things, to find in any caſe of the patient, as well the chief neſts, as nouriſhment of this morbifick matter. But as to the evident cauſes they are very many, and alſo of diverſe ſorts. For hitherto ought to be referred whatſoever move, either the blood and the other humours, or trouble the animal ſpirits and force them into irregularities. Aſthmatical perſons can indure nothing violent, or unaccuſtomed: from exceſs of cold, or heat, from any vehement motion of body or mind, by any great change of air, or of the year, or from the ſlighteſt errors about the things not natural, yea from a thouſand other occaſions they fall into fits of difficult breathing.

The Prognoſticks of the Diſeaſe.

As to the prognoſtick part, an inveterate Aſthma is difficulty or ſcarce ever cured; notwithſtanding the medicines and method of healing being rightly ordered, oftentimes great ſuccour is afforded, *viz.* the fierceneſs of the fits is diminiſh'd, longer reſpites are procured, yea, even the dangers of life it ſelf, ſeeming frequently to be imminent are removed.

This diſeaſe growing worſe, either threatens a Conſumption, or a Dropſie, or ſome drowzy,

drowzy, or convulsive affect; accordingly as the Serum by reason of perspiration being hindred, being more abundantly accumulated (because the sick cannot sleep enough in their beds) it is either fixed in the lungs, or transfer'd into the habit of the body, or into the brain it self. For this very reason the diseased do find themselves better in Summer, when they breath more freely, than in Winter; likewise better in hot countries than in cold, the South or West wind blowing, than the North or East.

Of the curatory method of an Asthma there will be two chief indications, or rather so many distinct methods of healing, *viz.* Curatory and preservatory. The first instructs what is to be perform'd in the fit it self, that the Patient may be delivered from present danger; the other, by what out of the fit, we ought to endeavour the taking away the morbifick cause, lest that distemper be repeated more often, or more heavily. *Two chief Indications.*

1. Therefore a fit urging, there will be two chief intentions of curing, *viz.* first, that a more free breathing be procured, as well upon the account of air, as of the Lungs, at least so far, as may suffice to support life; and secondly, that the organs of breathing may be withdrawn, and restrain'd, as soon as may be, from the Convulsions begun, and usually obstinately continuing. *What is to be done in the fit.*

1. As to what respects the former, let the Patient be placed in an upright position of body, in a more open place, and pretty airy, free from Smoak and breath of by-standers; then let it be indeavoured that the Lungs, being made free from all obstruction, and inward oppression, and also external compression, may be able to draw and change the breath more easily. For these purposes lest the bulk of the nether bowels compress or straiten the precordia, the belly is to be loosen'd by a Clyster, the apparel and what ever binds about the Breast to be loosened; also when in this case either from the blood swelling up inordinately within the Pneumonic vessels, or from the Serum distilling out of the Arteries and Glandules into the tracheal passages, they are wont to be oppressed, the impetuosity and instigations of either humour ought to be restraind and appeased; insomuch that if strength endure, and the pulse be strong enough, Phlebotomy is oftentimes convenient. Moreover those things are carefully to be administred which dispatch away the Serum and superfluities of the boiling blood by urine, as well as sweatings: to which intention, Juleps, Apozemes, commonly call'd Pectorals, do notably conduce; yea, powders of shells, millepedes prepared, Spirits and volatile salts, are successfully used. In the mean time besides let there be administred whatsoever opens and makes slippery the passages of the Trachea, and moves expectoration, and whatsoever, if need be, gives stop to a Catarrh distilling upon the same; for which purposes, Lambitives, Lohochs, pectoral Decoctions and suffumigations are good. *1 Intention to facilitate breathing.*

2. As to the other intention of curing in these Convulsive fits, *viz.* that the organs of breathing may be restrained from the Convulsions begun, and may quietly return to their ordinary task, (unless this succeeds of its own accord, after the boiling of the blood and Serum in the Lungs be appeased) we must use Antispasmaticks or remedies against Convulsions, and Anodynes: for medicines which are used to be administred in hysterical passions, do conduce in a convulsive Asthma. *2 Intention to free from Convulsions the moving parts. Remedies which dissipate the spirits profit for this end.*

Spirit of Harts-horn, of soot, and especially of sal Armoniac distill'd with gum Ammoniacum; also the tinctures of gum Ammoniacum, of Sulphur, of Castor, of Asa fetida, Syrups of Ammoniacum, Sulphur; Oxymel of squils and such like, which because they are of an ingrateful tast or smell, as it were dissipate the spirits and withdraw them from tumults, do sometimes help notably. But if the spirits being outragious cannot by this means be appeased, we must assay Narcotics, that some of them being subdued the others may be reduced to order: for surely unless a stuffing up of the Lungs, with a great oppression of the Precordia do hinder, Opiates do sometimes greatly profit. In the dreadful fits of this disease, when other medicines had effected less, I have often administred successfully Diacodium, as also Laudanum Tartariz'd. But these may not be exhibited without great circumspection, because whereas more or less they hinder breathing (which already is difficult and too much hindred) they frequently bring the Patient into danger of life. Besides this, that the Pneumonic spirits may be diverted from their Convulsions, it is many times expedient to molest the spirits in other places; for some of the spirits being in other places afflicted most commonly the residue as well as those that are smitten do dismiss their irregularities: Wherefore Vesicatories, Cupping-glasses, ligatures, and painful frictions bring help *Or do bring them asleep.*

help; alſo for this reaſon vomits are ſucceſsfully taken in the midſt of a fit. The ſcope of healing being now deſign'd, after what manner the patients in an urging fit of an Aſthma ought to be handled, it yet remains for us to propound ſome more ſelect forms of Remedies appropriated to the ſame ends.

Forms of Remedies. In the firſt place therefore to give a ſtop to the flux of blood and ſerum, and to diſmiſs their ſuperfluities deriv'd from the Lungs by ſweat and urine, theſe enſuing are preſcrib'd.

Take the water of ground-Ivy eight ounces, of Rue, Pennyroyal, Dragons, of each two ounces, of ſal prunella one dram and a half, Syrup Byzantinus, red Poppies of each one ounce; make a Julep, take it three or more times in a day, the doſe three or four ounces.

An Apozeme. *Take graſs roots three ounces, roots of Kneeholm two ounces, candi'd Enula campane one ounce and a half, barly half an ounce, Raiſons of the Sun, one ounce, boyle them in three pound of water to two pound, adding to your ſtrain'd liquor ſal prunella one dram and a half; ſweeten it, if there be occaſion, with Syrup Byzantinus or of Violets.*

A Tincture. *Take tincture of Sulphur three drams, the Doſe ſix drops to ten, evening and morning in a ſpoonful of Syrup of the juice of ground-Ivy, or Violets.*

Take of fæcula of Aron and Briony, of each one dram and a half, flower of Sulphur one dram, flowers of Benzoin half a dram, Suger-candy half an ounce, Liquoriſh two drams; make a powder to be taken to half a dram or two ſcruples twice in a day with the former Julep or Apozeme: or,

A Powder. *Take of the powder preſcribed two ounces, hony or Oxymel what will ſuffice, make a Linctus, take about half a ſpoonful evening, and morning, and at other times lick it with a ſtick of Liquoriſh.*

Take Syrup of Horehound, of Garlick of each one ounce and a half, tincture of Saffron, Caſtor, of each two drams mix them, take a ſmall ſpoonful in the fits.

Mixtures. *Take of ſpirit of ſal Armoniack with gum Ammoniacum three drams, of ſnail water, and of Earth-worms of each three ounces, Syrup of Horehound two ounces, mingle them, take by a ſpoonful once in four or five hours.*

Take of the powder of Hedge muſtard, or of ground Ivy gather'd in the heat of the Sun one ounce, of Oxymel ſimple enough to make a Linctus.

2 The Indication preſervatory propoſes what is to be done out of the fit. 2. So much concerning the method, and medicines requiſite in the fit of an Aſthma. The other indication preſervatory deſigning the taking away of the whole procuring cauſes and the morbific matter, contains two parts or diſtinct ſcopes of cure: both which for the moſt part are wont in the practice to be complicated and adminiſtred together. One of theſe endeavours to amend the conformation of the Lungs, if it be any way hurt or faulty, and the other to take off the irregularities of the moving parts and ſpirits, appointed for them. We ſhall beſt anſwer both theſe intentions if the remedies vulgarly call'd pectorals, are mixt with anticonvulſives, and the uſe of theſe with other medicines reſpecting the preparation of the whole body and emergent ſymptomes be apply'd between whiles. For which purpoſes the method and enſuing forms of remedies may be adminiſtred.

Suggeſts two Intentions of healing.

Forms of Remedies. *Take of Aloes roſata a dram and half, flower of Sulphur a dram, ſalt of Amber half a dram, Tar what will ſuffice, make 24 pills, take 4 every, or every other, or every third night. or,*

Pills. *Take of gum Ammoniacum, Bdellium diſſolv'd in vinegar of ſquils of each half an ounce, flower of Brimſtone three drams, powder of hedge muſtard and ſavory of each half a dram, make a maſs with Syrup of Sulphur or Oxymel of ſquils; make ſmall pills, take 3 every evening. or,*

Take Hog-lice prepar'd two drams, flower of Benzoin half a dram, ſalt of Amber two ſcruples, extract of Enula campane half a dram, Caſtor half a dram, Saffron a ſcruple, Venice Turpentine enough to make a maſs, form ſmall pills, take 4 every evening and morning except the times of purging.

But if this form of Pills will not pleaſe, or the above mentioned Medicines profit little, afterwards the enſuing ſhall be eſſay'd to free the Lungs from obſtruction.

Take

Take spirit of gum Ammoniacum distilled with sal Armoniac three drams, the syrup of Ground-Ivy three ounces, magistral Snail and Earth-worm water of each an ounce, tincture of Saffron two drams, mingle them and take a spoonful evening and morning. Or, Mixtures.

Take Tincture of Ammoniacum three drams, the dose from 15 to 20 drops in a spoonful of Oxymel, or of syrup of Ground-Ivy. Or,

Take Tincture of Sulphur three drams, dose from 7 drops to 12 or 20 in a convenient vehicle at the same hours.

In like manner other spirits endued with a volatile salt, and mixt with pectoral Syrups and Cephalick waters, may be prescribed successfully evening and morning.

In place of a mixture or an Asthmathical Julep from distill'd-waters in the shops, let this following magistral be prepared for frequent and several uses.

Take roots of Enula campane, Orris of Florence, *Angelica, Masterwort, of each four ounces, of Bryony a pound, the leaves of white Hore-hound, Hyssop, of Savory, Penny-royal, Ground-Ivy of each four handfuls, Juniper and Ivy-berries of each a pound, Bay-berries half a pound, sweet Fennel, Carue, Annis, Louvage, Dill seeds of each an ounce, Cubebs two ounces, Long-pepper, Cloves, and Mace of each an ounce, all being sliced and bruised pour on them eight pound of* Brunswick *beer, distil it in common organs, mix the whole, and as you use it sweeten it with Sugar, or Syrup of Ground-Ivy, or with Oxymel.* A distill'd water.

Moreover in lieu of Oxymel, or any common pectoral Syrups, the ensuing forms of medicines appropriated to an Asthma are prescribed; and in the first place the Syrup of Enula-campane invented by *Horatius Augenius* and called by his name, and afterwards commended by *Platerus, Sennertus, Riverius* and other renowned Practitioners, ought to be observed in this place, and used frequently.

Take of Enula-campane, Polypodie of the Oak prepared of each two ounces, Currance two ounces, Sebestens 15, Coltsfoot, Lungwort, Savory, Calaminth, of each a handful, a large leaf of Tabaco, Liquorish two drams, Nettle and Silk-worm seeds of each a dram and a half, boyl them in Wine mingled with Hony and diluted to a pound and half, and with a little Sugar make a Syrup: take it by it self in form of a Linctus, or a spoonful evening and morning, or add a spoonfull to the distilled water or Apozeme. Magistral Syrups.

Take Florence *Orris-roots, Enula campane of each half an ounce, Garlick peel'd four drams, Cloves two drams, white Benzoin a dram and half, Saffron a scruple, slice and bruise them and digest them warm in a pound of rectified spirit of Wine for 48 hours; to it strained add fine Sugar a pound, put it in a Silver Bason upon live coals, stirring it till it flame, and let it burn as long as it will, then the flame being out make a Syrup of it to be taken as the former.*

Moreover hither may be referred the decoction of an old Cock so much magnified by renouned Physicians as well antient as modern, for the cure of an Asthma; which although *Septalius* damn'd for gross and of no efficacy, notwithstanding *Riverius* after him vindicates; and to attest the efficacy of this remedy oppose his own experience to the others. These broths are of two kinds, *viz.* either with or without purgers; and various Recipes of each do remain in practical Authors, all which would be tedious to recount here, we shall propose one or two forms. The decoction of an old Cock.

This is the common example without purgers.

Take of Orris and Enula-campane-roots of each half an ounce, Hyssop and Hore-hound dryed of each six drams, Carthamus seeds an ounce, Annis and Dill seeds of each two drams, Liquorish scraped and Raisins stoned of each three drams; let them be prepared and sewed into the belly of an old Cock, which boyl in fifteen pound of water until the flesh depart from the bones, strain it and let it settle: of the clear liquor the dose six ounces, with an ounce of Oxymel simple. Or if the remedy be desired to be solutive, dissolve of fresh Cassia and Manna of each half an ounce in each draught, taken for many days together, and sometimes for a whole month. Without purgers.

Riverius prescribes a convenient form of such a kind of purging broth.

Take

Take Enula-campane and Orris roots of each a dram and a half, Hyſop and Coltsfoot of each a handful, Liquoriſh and Raiſins of each two drams, Figgs 4, Senna cleanſed three drams, polypodie of the Oak and Carthamus-ſeeds of each half an ounce, Anniſeeds a dram and a half, boyl them with the third or fourth part of an old cock, make broth for one doſe to be taken in the morning, let them continue it for twelve or fifteen days.

The firſt Hiſtory of a Convulſive Aſthma.

Of many examples of Aſthmaticks I ſhall propound only two ſingular ones, *viz.* I will deſcribe the Hiſtory of one who hath been obnoxious to fits of this diſeaſe meerly convulſive, and of another partly convulſive and partly Pneumonic. A Noble perſon, proper and well ſet, and formerly healthful enough, after that by chance he had ſtruck his ſide againſt ſome ſolid body, from that time contracted a hurt, and afterwards an Aſthmatical taint. For we may ſuſpect, a certain folding of the Nerves belonging to the precordia placed near was prejudiced by that accident, and from ſuch a cauſe afterwards this diſtemper derived its origine, *viz.* at ſome incertain times the pain at firſt troubled him about that place, and preſently a moſt painful Dyſpnœa enſued with a laborious and laſting contention of all the breathing parts; inſomuch that while the fit laſted the patient was thought to be in the agonie of death. I was firſt ſent for to him after labouring for two days with ſuch an invaſion of the Aſthma that he was accounted in a deſperate condition; Notwithſtanding finding his Lungs without hurt, our prognoſtic willed as yet to hope well, and immediately by a conſultation of other Phyſicians it was preſcribed as followeth.

The Cure.

Take of ſpirit of gum Ammoniacum diſtill'd with ſalt of Tartar three drams, take from 15 to 20 drops in a ſpoonful of the following Julep, drinking after it five ſpoonfuls, repeat it every ſixth hour.

Take elder flower, camomile, and Penyroyal water of each four ounces, Snail-water two ounces, Sugar one ounce, mingle them, between whiles he took a doſe of the following powder with the ſame Julep or pectoral decoction.

Take powder of Crabs eyes two drams, ſal prunella a dram and a half, ſalt of Amber half a dram, mix them, divide it into eight doſes.

Large veſicatories were applied on the inſide of his arms near the arm-pits, Clyſters daily adminiſtred, and frequent frictions. By the uſe of theſe he received ſudden and unexpected help, and within a few days became wholly free from that fit. Afterwards as often as he had any perception of the firſt motions of this diſeaſe, preſently he took a large doſe of that ſpirit with the ſame Julep 3 or 4 times a day, by which remedy often uſed, one while for preſervation, another while for the cure ſake, he was void of any outragious invaſion from his habitual Aſthma for above two years, in the mean while ſuffering ſome more light aſſaults but eaſily blown off.

The ſecond Hiſtory of a mixt diſeaſe.

A very Honourable old Gentleman dignified by many great Titles, himſelf being greater than all them, after that for ſome years he had liv'd every winter obnoxious to a cough and a moderate ſpitting, and gentle enough, at the end of the laſt Autumn returning from a long journey he was leſs healthful: (as it was thought by cold he had taken) for he complained of a pain in the middle of his breaſt next the ſternon, which growing worſe in an evening, as ſoon as warm in his bed, wholly diſturbed his ſleep, and moſt part of the night was very troubleſome: notwithſtanding without any Dyſpnea or evident ſign of an Aſthma. To take away this pain both Purging and Bleeding were uſed, pectorals and antiſcorbuticks were daily uſed, liniments and fomentations were applied to the place pained, yet without any great ſucceſs or eaſe: for the alteration which happened afterwards declined rather to worſe; for a difficult and obſtructed breath came upon the pain's growing a little more remiſs, ſo that from his firſt ſleep, or inclination thereto he became aſthmatical and gaping for breath, and ſuffering about the precordia he was conſtrained to ſit upright in his bed. Moreover a dyſpnœa of this kind and a convulſive agitation of the breathing parts did not only return every evening, but from day to day were rendred more outragious and laſted a longer time; inſomuch that one night waking from his ſleep, for many hours he was aſſaulted with a moſt painful fit of an Aſthma which had almoſt kill'd him. The Phyſicians being at a great diſtance from him, although deſired about midnight came not while the morning following, mean while by reaſon of bleeding uſed by a Barber this worthy Gentleman revived, being redeemed from the jaws

of

of death; but afterwards by the conſultations of Phyſitians that day a ſlender diet and looſening the belly by a Clyſter were preſcribed: In the evening and early in the morning he took of Spirit of gum Ammoniac diſtilled with ſal Armoniac 12 drops in a proper vehicle, and continued the uſe for many days after; Veſicatories were applyed on the inſide of his arms near the armpits; moreover Juleps and pectoral Decoctions, Lohochs, Clyſters, and alſo mild Purges were taken by turns; alſo Phlebotomie was repeated after two days. Whereas formerly he was uſed to drink for his mornings draught a pint of Ale with Wormwood and Scurvy-graſs, in the room of that about eight a clock he took 15 drops of Elixir Proprietatis tartariz'd in a draught of Coffee made with Sage. By theſe remedies his aſthmatical fits preſently abated of their fierceneſs, inſomuch that the beginning and end of every night were quiet enough, but in the middle light troubles about the precordia kept him from ſleep, ſitting upright an hour or two. Certain other medicines were propounded by thePhyſitians,and others of diverſe ſorts privately offered by his friends,which notwithſtanding the Honourable Perſon utterly rejected,or ſoon loath'd; and that the rather, becauſe, winter then being almoſt ſpent, his reſtauration was hoped for by the coming on of the Spring and enjoyment of the Country air without the help of much Phyſick. Wherefore of the medicines above mentioned he uſed one while this and another while that a little by turns, and ſometimes kept holy-day from them all; but in the interim although his aſthmatical invaſions little or nothing troubled him as formerly in the night, yet by reaſon his Lungs were very much obſtructed, and a ſerous humour fallen down into his feet, he was not able to walk faſt or aſcend ſteep places, without a painful dyſpnœa, being in danger of choaking; and now (while I am writing this) not ſo much an Aſthma or Conſumption, as a Dropſie is feared.

The Ætiologie of this caſe is clearly enough manifeſt from the above-mentioned things, *viz.* one procuring cauſe of this Aſthma was a lung greatly obſtructed, inſomuch, that whereas the blood boiling, paſſed through the precordia more impetuouſly, the air requiſite for its ventilation could not be admitted in plenty enough; wherefore to ſupply this defect there was neceſſity that the Lungs and their motive organs ſhould be provoked into more frequent, and more vehement throes. Afterwards from thence enſued a convulſive diſpoſition of the fibres moving the breaſt: for the heterogeneous matter deſcending into thoſe parts together with the nervous juice, and being gathered to a plenitude, firſt excited pain and afterwards fierce and periodical convulſions in the pneumonic organs: and now although this latter diſpoſition ceaſe (becauſe the Elaſtick and ſpaſmodical matter is blunted or extinguiſhed by the ſerous illuvies) yet the other procuring cauſe ſtill remains, and hath got another aſſociate, *viz.* a worſe Devil than it ſelf, to wit a Dropſie.

The reaſon of this caſe.

SECT. I. CHAP. XIII.

Of a Dropſie of the Breaſt.

A Dropſie of the Breaſt is eaſily known.

IT is clearly manifeſt by certain and manifold diſcoveries, that the Region of the Breaſt is ſometimes affected with a Dropſie; for the ſenſe and ſound of water fluctuating, do moſt evidently demonſtrate it in living bodies; and Anatomical inſpection in the defunct. But yet concerning the cauſe of this Diſeaſe, and manner of coming to paſs, to wit, by what ways, and after what manner diſpoſed, the accumulation of water firſt begins within the hollow of the breaſt, as alſo how it is ſenſibly augmented, and frequently inſenſibly continued untill the Diſeaſe becomes deſperate, is a thing yet in the dark. Whenas there is a general diſtemper of a Dropſie or an Anaſarca appearing, and hath ſeized on the fleſh and cavities of the bowels every where, or in moſt places, we are not to admire if that illuvies of waters ſeize alſo upon the Pectorals: But beſides, ſometimes it happens, that the Region of the Thorax, is either firſt or only overflown, the other parts in the mean time remaining ſound enough, or only hurt ſecondarily.

Its cauſe is hidden.

About the origine of this Diſeaſe, and the manner of generation it is much diſputed whence, and by what paſſages that illuvies of water being found every where in the hollowneſs of the Thorax, doth come thither. Some Authors do derive it from above, *viz.* that it deſcends from the head by the Trachea; and others deducing its Spring from beneath, from the cavity of the Abdomen, alſo ſometimes from the Liver and Spleen, by I know not what blind ways, judge thoſe waters to be conveyed into the hollowneſs of the Breaſt. But neither of theſe Opinions challenge our aſſent, or deſerve our arguments to diſprove them: for none conſidering the paſſage of the blood and humours will acknowledge either this or that way of commerce. We cannot but affirm, that the ſerous humour, raiſing a Dropſie of the breaſt, does arrive thither either in a kind of vapour, which being exhal'd from the Precordia and ſides of the Thorax, is eaſily condenſed into water; or ſecondly, that the Serum is there depoſited under its own proper form, inaſmuch as it flows into that cavity from the mouths of the Veſſels, *i. e.* of the Arteries being open. We will anon enquire whether the Lymphaducts or veſſels bringing chyle, being any where open, or broke, do ſometimes produce that diſeaſe.

How many wayes it may be produced.

1. By Vapours condenſed there.

1. As to the former, it is ſo very probable that a Dropſie of the breaſt takes ſometimes its origine from vapours condenſed within its cavity, that it is a wonder how it ſhould be otherwiſe at any time, or that any ſhould live exempt from ſuch an effect. For how much is there of vapour that ſeparates from the boyling blood? and when it waxes cold in the precordia, how can it come otherwiſe to paſs but that the abundant vapour ſhould be condenſed in this encloſure into water, even as if ſhut within a Still? And truly it will not be eaſie to determine, when the vaporous ſteams are ſo unceſſantly heaped within the cavity of the breaſt, what may become of them, how they are conſumed, or from thence diſcharged abroad. Surely we muſt affirm, they either penetrate the ſides of the Thorax, or (which rather ſeems to be) they inſinuate into the pores of the Lungs, and ſo fly away in breathing. Certainly by either way, the vapours of the breaſt may exhale: and perhaps if either be defective, or hindred, by that means a Dropſie of the Breaſt may be cauſed.

2. By Serum depoſited there.

2. But moreover, I am apt to think, that this Diſeaſe alſo ſometimes happens in another manner (inaſmuch as the Serum diſtills from the veſſels in its proper form.) For in a cacochymical conſtitution of body, or a perſon very ſcorbutical, where the watery and weak blood every where caſts off its ſuperfluous Serum from its own conſiſtence, and every where ejecting it from the little mouths of the Arteries being looſed and open, excludes it from the clew of circulation, nothing is more uſual, than for the cavities not only of the Bowels, but alſo of the Precordia, yea the Brain it ſelf, to be overflown with that watery collection; moreover in ſo general a diſpoſition to a Dropſie, that one while this region, another while that, or another ſhould be firſt and almoſt onely poſſeſs'd; and that alſo ſometimes the inmoſt parts being untoucht, the

Which ſometimes breaks out from the Arteries.

the outward fleſh, *viz.* the muſcles and their interſpaces are overflown with that ſerous illuvies.

3. Among the veſſels that pour in the dropſical matter into the cavity of the breaſt, the Lymphaducts and parts bringing the chyle, do juſtly fall under a ſuſpicion. What relates to the former, it appears by anatomical inſpection, that a great company of theſe do creep thorough the whole Lungs, and do tend from their outer parts, ſtretching out themſelves inwards towards the paſſages of the breaſt, and for the moſt part pour out into them their liquour, which being ſuperfluous, they every where ſuck up from the arterious Blood. Therefore whenas theſe veſſels are obſtructed, or are by any means impeded from diſcharging their function, it muſt needs be that a heap of water be accumulated in the Lungs, which afterwards falling into the cavity of the breaſt, will excite a Dropſie in that region. For in truth, this Lympha reſtagnating within the conſiſtence of the Lungs, it often happens that the little bladders called Hydatides, in the outer ſuperficies of the Viſcera are raiſed up, which afterwards being broke, diſcharging the waters into the cavities of the Thorax, they produce there an Aſcites. A diſtemper of this kinde is often diſcovered in Sheep, when they dye by heaps of a Dropſie, by reaſon of a moiſt ſeaſon and watery paſture. And ſurely the following Hiſtory doth clearly ſeem to argue, that the Aſcites of the breaſt proceeds from the like cauſe ſometimes in a man, (there being yet a living example of this diſeaſe.) Lately a young man healthful enough and ſtrong, having accuſtomed himſelf to hunting and inſatiable riding, and other exerciſes of the body very immoderatea, while without detriment, at length he perceived a fulneſs in his Thorax as if it were a kind of ſwelling; inſomuch that the left ſide of his Lungs ſeem'd to begin to ſwell, and his heart to be thruſt out of its place towards the right ſide; for that he perceived the pulſation thereof to be on that part chiefly. After he had been for ſome time in this condition, on a certain day he felt as if a Veſſel had been burſt aſunder within the cavity of the Thorax, and from thence for the ſpace of half an hour, in that place, as it were the dropping of a humour falling from above into the bottome of his breaſt, was not only felt by himſelf, but could be heard alſo by the ſtanders by. Although he was at firſt ſurprized with the rarity of this affect, yet for that he was well enough as to ſtrength, appetite, ſleep, and other natural functions, immediately after he became ſecure, and negligent of Medicines; But afterwards by any motion, bending or ſtirring of his Body, a fluctuation of water gathered within on his left ſide, was felt by him; moreover, the motion and ſound was evidently perceived by others, either by handling, or by the ear. As without doubt this Gentleman was affected with a Dropſie of the Breaſt, ſo it ſeemed moſt probable that the diſeaſe had its original from thence, in regard the lymphaducts relating to the left ſide of the lungs, being firſt obſtructed near their inſertions into the paſſage bringing the chyle, did ſwell up to a great bulk, and afterwards being broken diſtill'd their humour into the cavity of the Thorax.

3. And ſometimes from the Lymphaducts.

A remarkable hiſtory of the like caſe.

When now an Inundation of the Precordia, and ſo of the vital Fort, was imminent, this Gentleman at length, thinking it time to provide for himſelf, entered into a courſe of Phyſick, and carryed certain Medicines into the Countrey for his cure, yet without any ſignal ſucceſs. Afterwards coming to *London*, he firſt conſulted the worthy Dr. *Lower*, being of his former acquaintance. He propoſing the opening of the Thorax for his only remedy, took care that the worthy Dr. *Micklethwait* and my ſelf ſhould be ſent for to the conſultation. Immediately an inciſion was appointed by the conſent of us all: wherefore, after proviſion for the whole being made, a Chirurgeon applyed a Cautery between the ſixth and ſeventh Vertebra, and the next day he put his Pipe into the Orifice cut into the cavity of his Breaſt; which being done, immediately a thick liquor whitiſh like Chyle, and as it were milkie, flowed out. There was about ſix ounces only taken from him the firſt time, and the next day as much more. The third day when a little greater quantity was ſuffered to come out, being affected immediately with great fainting, and afterwards being feaveriſh, he was ill for a day or two. Wherefore it ſeemed good to ſtop the iſſue of that matter till he recovered his temperament and ſtrength: but afterwards a ſparing evacuation of the ſame matter being daily made, the cavity of his breaſt was wholly emptyed: but as yet he wears a pipe in the orifice with a tap, which being opened once in a day and a nights ſpace, a very little of the humour flows out; in the mean while, being well in ſtomach, viſage, and ſtrength, he walks abroad, rides, and performs all exerciſes he was formerly accuſtomed

The reaſon thereof.

The Cure by a Paracenteſis of the breaſt.

cuſtomed to, vigorouſly enough. He uſed not (neither was there need of) much medicine, only after the Inciſion we adviſed temperate Cordials, *viz.* powder of Pearles, Juleps, and ſometimes Hypnoticks, and afterwards a vulnerary decoction to be taken twice a day.

By this method, and theſe forms of Medicines ſometimes continued, this worthy perſon ſeemed to recover his temper, and his ſtrength, and the habit of his body, and his breaſt exempt from the Dropſie. Notwithſtanding he ſtill wore a ſilver Pipe in the orifice of his ſide (out of which ichor daily flowed): and when after ſome months this being withdrawn, the Iſſue was ſhut up, a gathering of the ſame humour was made within the hollow of his breaſt, perceivable by the ſound and fluctuation thereof: but when that the diſeaſe returning, the ſame medicine was to be uſed, and inciſion of his ſide appointed, (Nature by chance diſcharging the function of a Chirurgeon) the matter being prone to burſt out, and flowing to the place made its own way. He is now neceſſitated (for preventing the illuvies of his Breaſt) to keep that orifice conſtantly open like a ſink.

From theſe things I think it manifeſt enough, that an Aſcites of the Breaſt, ſometimes ariſes from the lymphatick veſſels burſt aſunder within the Lungs; neither doubt I leſs but that the ſame affection may be cauſed from the chyliferous paſſages being broke within the Thorax; notwithſtanding, this chance ſo rarely happens, that as yet I have not known it by my own obſervation, or others relation. Moreover, it little avails to make inquiſition into the Ætiologie of ſuch a diſeaſe, becauſe it is not only apparently incurable, but in a ſhort time mortal; becauſe the Precordia are incontinently overflown by the inundation of the chyle, and alſo the blood and the animal ſpirits being defrauded of their wonted ſupply of nutritious Juice, are immediately diſſolved.

The differences of this diſeaſe.

From the various cauſes of this Diſeaſe even now ſet down, it will be eaſie to collect its differences: For firſt a Dropſie of the Breaſt, is either ſimple and primary, peculiar to this Region; or ſecondary, coming upon a general Dropſie, as it is wont often to be in cachectic perſons. Secondly, this Diſeaſe is diſtinguiſhed as to the places affected, *viz.* foraſmuch as water is either collected in the whole breaſt, or only in one ſide thereof. Thirdly, as to the matter accumulated in a pectoral Aſcites, which one while is limpid and plainly wateriſh, another while more thick, whitiſh, and as it were milkie, ſuch as we have deſcribed in the foregoing Hiſtory.

The Diagnoſtick ſigns.

The diagnoſtick ſigns do manifeſtly enough diſcover this diſeaſe: *viz.* the fluctuation of water is perceived by handling, and by feeling at every bending of the body, and the ſound is clearly heard. Moreover they are affected much with a dry and empty Cough, as alſo with a Dyſpnœa almoſt continual and painful, eſpecially while they aſcend ſteep places; Beſides, they have a thirſt, with a little feaver, and in the night after the firſt ſleep, great diſquiet and toſſing of the body, proceeding from the vapours being elevated by the heat being more intenſe. Sometimes there comes upon theſe a Palpitation of the heart, an intermitting or diſturbed Pulſe, and frequent faintings of the ſpirit. As to the prognoſtick, this diſeaſe is always difficult to cure, and among the vulgar accounted incurable. And ſurely if it come upon an Aſcites of the Abdomen or an Anaſarca throughout the whole body, it is judged not without cauſe deſperate; But if the affection be primary, and happen to a body otherwiſe ſound, we are not altogether to deſpair of Cure.

The Cure.

What relates to the curatory part of this Diſeaſe, the chief Indications will be three, Curative, Preſervative, and Vital, according to the common method of curing in moſt other Diſtempers.

The firſt has regard that the water heaped up in the cavity of the Breaſt by any means be evacuated. The Second provides, that afterwards a new illuvies be not gathered in the ſame place. The Third procures the reſtoration of ſtrength, and the ſymptoms impairing it to be removed with expedition.

What Intentions of healing the firſt Indication ſuggeſts.

To ſatisfie the firſt Indication, and that an Aſcites of the Breaſt may be emptyed, there are but two ways or means of evacuation to be met with, whereby this collection of waters may be drayn'd, *viz.* Either that the veſſels of the Breaſt, and the paſſages of the humours, being emptyed, might ſuck up that Lympha being rarified, and afterwards by the paſſages of the blood or air convey them forth: or ſecondly, that by an inciſion of the ſide, thoſe waters may be drained forth plentifully in their own Species.

That

That former manner although more ſeldom, yet ſometimes ſucceeds; which I can atteſt out of my own obſervation. For the conſiſtence of the Lungs being ſpongy within, and externally very porous, while by every turn of the Diaſtole, they are drenched in the underlying waters, they ſometimes imbibe them being turn'd into vapour; and ſo diſpatch them to the blood, or continually exhale them with aire coming out at the mouth. That an effect of this ſort may more eaſily happen to cure this diſeaſe, medicinal aids are taken: For that intention therefore the paſſages of blood, aire, and humours ought to be emptyed as much as may be, and to be kept ſo empty. For this purpoſe, Purges, Diureticks, and more mild Diaphoreticks are methodically, and alternately exhibited; alſo remedies for the breaſt, and expectorating, challenge here their place; let the Diet be ſlender and warming, and a government appointed as to all other things of that nature, that the blood may be made to exhale the more, and all the ſuperfluous humours to evaporate. I think good to annex ſome forms of Medicines accommodated to theſe uſes. *The firſt Intention.*

Take of Chervil-roots, Knee-holme, Polypodie of the Oak, of each an ounce, Agrimony, white Maidenhaire, Oak of Jeruſalem, Ground Ivy, of each one handful, Carthamus-ſeeds one ounce, Florence-Orris half an ounce, ſeeds of Danewort 5 drams, Calamus Aromaticus half an ounce, boyl them in four pound of Spring-water, to the conſumption of a third part, adde to it being ſtrained Senna one ounce and a half, Agarick two drams, Mechoacan and Turbith, of each half an ounce, yellow Sanders a dram and a half, Galangal the leſs one dram, boyl them two hours gently, and cloſe covered, afterwards ſtrain it and adde of Honey two ounces, clarifie it with the white of an Egge, make a purging Hydromel. The Doſe is from ſix ounces to eight, in the morning, twice or thrice in a week. Or, *A Purging Hydromel.*

Take Mercurius Dulcis one ſcruple, Reſine of Jallap half a ſcruple, Balſam of Peru what ſuffices to make four Pills, to be taken in the morning, and to be repeated within five or ſix dayes.

Take Tincture of Sulphur three drams, take from ſeven drops to ten, at night and in the morning, in a ſpoonfull of the following mixture, drinking after it three ſpoonfulls. *Tinctures.*

Take of the water of Snails, Earth worms, and compound rhadiſh water, of each four ounces, water of Elder-berries fermented one pound, Syrup of Juice of Ground-Ivy two ounces, mix them for a Julep. Or, *Julep.*

Take of Tincture of Ammoniacum, or Galbanum, take twenty drops evening and morning in the ſame mixture. Or,

Take of Hog-lice prepared two drams, flower of Sulphur two ſcruples, flower of Benzoin one ſcruple, powder of wild Carrot and Burdock-ſeeds, of each half a dram, Turpentine of Venice, enough to make a maſs. Make ſmall Pills. Take four evening and morning, drinking after them a ſmall draught of the Julep. *Pills.*

At Nine a Clock in the Morning, and Five in the Afternoon, let him take four onces of the Compound Lime-water, by it ſelf, or with any other proper remedy. *A Lime-water.*

For ordinary drink take the following Bochete.

Take Sarſaperilla ſix ounces, China two ounces, white and yellow Sanders, of each ſix drams, ſhavings of Ivory and Hartshorn, of each three drams, Calamus Aromaticus half an ounce, Raiſins half a pound, Liquoriſh three drams, boyl and infuſe them in twelve pound of Spring-water to ſix pound, ſtrain it. *A Bochet.*

Formerly about twenty five years ſince, when I reſided at *Oxford*, I was ſent for to a young Scholar, who ſuffered for three weeks ſpace under a pain of the Thorax, and a moſt grievous Dyſpnœa conſtantly troubling him in the evening, moreover, from a more quick motion of body, or going more haſtily than uſually up any ſteep place, he laboured extreamly, he could not ly down long on either ſide, but was neceſſitated to lye in his bed ſupine, and his head erect; if perhaps he attempted to lye on either ſide, immediately pain followed that poſition of body, and if perhaps he roll'd himſelf from one ſide to another, the pain being alſo preſently tranſlated, he felt as it were water to wave from place to place. Hence I had a juſt ſuſpicion of a Dropſie of the Breaſt, whereof that I might be more aſſured, I order'd that lying upon his back on his bed, he would ſuffer his head to bend backward from the bed-ſide to the floor, immediately he had a plain perception of *A Hiſtory of a Patient.*

of water running towards the Clavicles, together with a change of the pain thither. Moreover if at any time he grew more hot than uſual, from motion, or in his bed, or by the fire, he preſently felt ſenſibly in his breaſt, as it were water boyling over the fire, and alſo complained of a Vertigo, and a ſmall decay of Spirits. Wherefore, when we might lawfully collect out of theſe things rightly conſidered, that he was affected with a dropſie of the breaſt, I preſcribed the following method and medicines with ſucceſs.

The Cure of him. *Take of Mercurius Dulcis fifteen grains, Reſine of Jallap half a ſcruple, Syrup of Roſes ſolutive what ſuffices, make three Pills. He took them early in the morning and had twelve ſtools with great eaſe; afterwards on the third day by the ſame Medicine he had but four, but with greater benefit; he took afterwards for many dayes ſix ounces of the Pectoral and Diuretick Apozeme twice in a day, and laſtly repeating the Purge he perfectly recovered.*

SECT.

SECT. II.

Of Splanchnick remedies, or those which respect the bowels of the lower Belly.

CHAP. I.

Of the Jaundies and the remedies thereof, and the manner and reason of their operations.

HItherto we have largely enough unfolded the Pathologie and curatory method of the Thorax; now it follows next to finish our task in like manner about the lower Belly. But we have in our former tract for the most part described already the medicines belonging to this region, and the manner and reasons of their working, together with the Anatomy of the Stomach and Intestines: we have treated of remedies stomachical, dysenterical, and others belonging to the intestines, as also diureticks together with the reasons of them: Moreover we have sufficently elsewhere handled the ætioligie of Hypochondriack, and Hysterical remedies. What therefore remains, of Hepatical distempers as well proper, as of those vulgarly ascrib'd thereunto, and of their remedies we will discourse in this Section; notwithstanding in each of these, we will bestow more labour, about the curatory, than pathological part.

Diseases of the Liver.

The chief diseases by which the Liver and the appendix thereof, are wont to be incumbred, are the Jaundies, and a Tumour, and under this latter many other affects, *viz.* obstruction, inflammation, induration, and schirrus are numbred; to all which are vulgarly appointed remedies commonly called Hepaticks, and which make up a great part of the Dispensatory.

The Jaundies is either a disease by it self, primarily beginning, which is here properly treated of: or it is an effect or product of another disease; as when it arises upon an intermitting Feaver, which oftentimes it puts an end to, of which also we will presently treat by the by.

The Jaundies.

An Icterical distemper by the common consent of most is judged to arise in as much as the yellow choler, not at all, or not enough received, from the ends of *vena porta*, into the passages of the cholerick pore, overflows into the mass of blood and pollutes it with its greenness, whereby also the very skin is discolour'd.

The cause of it.

That obstruction is wont to happen after many manners and in various places. For sometimes it happens near the extream ends of either kind of vessels, *viz.* the end of the *vena porta*, and the *porus bilarius*; the interspaces whereof happen frequently to be compressed, and stopt by reason of the Parenchyma of the Liver being tumefied, or otherwise vitiated; wherefore the humour of the gall not being transferred out of the separating vessels of the *porta* into the other receiving vessels, turns back upon the blood. Secondly, the passage of the humour of the gall is sometimes intercepted in the middle passages of the cholerick pore; for that the cavities of these are filled either with a viscous, or sandy, and sometimes with a stony matter; as is plainly discerned in the Livers of beasts in the winter season, while they are fed with hay and straw. Thirdly, it is also manifest by Anatomical observation, sometimes an obstruction in the very bladder of the gall, or in the cystic passage is the cause of the Jaundies; for if at any time, it being filled with stones, receive not the choler, or being here shut up, or grown together, it restrains the descent of the choler towards the guts, that humour although well separated from the blood, is constrained to flow black into the mass thereof, and so propagates the Jaundies.

The opinion of Sylvius of the cause of the Jaundies.

Against this most received opinion, by which it is judged, that the cause of the Jaundies for the most part consists on this side the *vesica fellis* or about it towards the Liver: the most Renowned *Sylvius* altogether places it without this, *viz.* in the Cystic

Cyſtic or common paſſage. For ſuppoſing the choler not to be ſeparated from the blood, within the paſſages of the Liver, but in the very bladder of the Gall to be propagated of a humour brought thither by the Arteries; He judged the greateſt part, being carried upwards by the paſſage of the *pori bilarii*, to be poured into the blood for ſome notable uſes, and alſo another part to deſcend beneath to the Inteſtines, alſo for neceſſary uſes: wherefore if this latter ſluce be ſhut, all the choler is carried upwards into the blood, and filling it too much with this humour, perverts it from its genuine temper, into an Icterical.

But truly leſt the ſtopping of the paſſage of the bladder, or of the common paſſage, (neither of which eaſily happens, or from any light occaſion) may ſeem leſs efficacious to excite any Jaundies; therefore, *whether ſuch an obſtruction hath place, or no*, the moſt Renowned man ingeniouſly ſuppoſes beſides, *The choler while it is generated in the bladder does undergo ſometimes a notable change, by which it is moved, and is born about more plentifully and impetuouſly*, towards the blood, *with which yet it is leſs mingled than it was wont to be, but only confounded together with it, and ſo more eaſily departs from it and infects and tinges the ſolid parts with its colour.*

But that the *choler in the Jaundies may be rendred unfit to mix with the other humours, or to be nearly united*; he determines it to be done, *by a ſpirit too valatile, mixed plentifully with it, and ſo making it more ſpirituous and immiſcible with others.* He confirms this aſſertion by two inſtances, *viz.* in as much as the moſt ſpirituous poiſon from the biting of a Viper, and the too much uſe of the more generous drinks, *viz.* Wine and Strong-waters, cauſes ſometimes the Jaundies. Moreover he endeavours to procure credit to this Hypotheſis, for that this diſeaſe is wont to be cured, not only by medicines opening obſtructions, but by them which blunt the force of a raging volatile ſalt (of which *ſort are the decoction of Hemp-ſeeds, alſo* Venice *ſoape* with many other things of the ſame ſort.)

The Authors opinion.

It belongs not to this place, neither is it to our purpoſe to deſcend to end this contention, nor dare I now raſhly determine it (ſince it hath tired ſo many Renowned Wits of the Moderns) whether really the choler be made in the bladder of the Gall, or whether it be only ſeparated from the blood in the Liver, the great organ of ſeparation; I confeſs this latter opinion beſt pleaſes me. And weighing theſe things ſeriouſly I am induced to think the cauſe of the Jaundies to conſiſt chiefly in this, that the choler being ſever'd in the Liver, is not, by reaſon of the ways being obſtructed, at all, or not enough conveyed to the bladder of the Gall, but that it muſt of neceſſity regurgitate into the maſs of blood; notwithſtanding in the mean while we deny not, but this affect may ſometime ariſe (although more rarely) from the Cyſtic paſſage or common pipe being obſtructed. But alſo we think the fault of the blood to preceed in part and perhaps ſometimes wholly for the morbific cauſe; when to wit from its ſulphurous and fixt Saline Particles above meaſure exalted, the choler is more plentifully, or quicklier generated in the maſs of blood, than can be ſeparated or diſcharged forth by the ordinary ways; wherefore this, ſeparating every where from the blood with the Serum, is affixed to the ſolid parts, and impreſſes its tincture upon them.

The cauſe of this diſeaſe ſometimes in the blood.

And without doubt it is for this reaſon that ſome poiſons, and chiefly the biting of Vipers, and the dayly uſe of more generous drinks, induces the Jaundies in bodies before ſound, for whoſe cure ſometime Phlebotomie, and medicines reducing the blood to a right temper, are wont to profit more than thoſe opening obſtructions. Moreover it ſeems for this reaſon, that a tertian intermiting Feaver ſo frequently terminates in the Jaundies; for we may not ſuſpect the paſſages of the Liver can be by any means obſtucted, ſince in all fits, ſo great an agitation of the blood and humours, by cold, and heat, and ſuch an evacuation of them happens either by vomit or ſweat: and truly even as feaveriſh fits are cauſed, inásmuch as the ſulphurous part of the blood being too much advanced, in the firſt place perverts the nutritious juice into a morbific matter, and afterwards being inflam'd conſumes and exterminates it; ſo when the fixt ſalt is at laſt exalted together with the ſulphur in the blood, and for that cauſe meer choler is abundantly engendered, the feaveriſh enkindling of the blood ceaſes, by reaſon of the reſtrictive force of the fixt ſalt, and in place thereof the diſtemper of the Jaundies doth ſucceed. But as the blood being too much advanced to a ſulphureo-ſaline diſtemperature cauſes the Jaundies in any, though leaſt prediſpos'd to it; ſo in others very much diſpoſed thereto, having the ways of choler obſtructed & the ſulphur of the blood being too much depreſſed, it produces a freedome from that diſeaſe; for I have known many cachectick and phlegmatick perſons, to have been free from the Jaun-

dies, though they have ſuffered under obſtructions and indurations of the Liver, as to moſt of its paſſages.

The cure of the Jaundies.

It is not worth our labour to make more ample diſquiſition about the ætiologie of this diſeaſe; as to what reſpects the cure, there will be three primary indications, all which (for what may be the chiefeſt of them, and firſt to be exhibited, for the moſt part is concealed) we ſhall proſecute together; wherefore the intentions of healing ſhall be, 1. That the obſtructions of the paſſages or choler-bearing veſſels be opened, if perhaps any ſhall be either in the *porus bilarius*, in the Cyſtic paſſage, or in any place about the Liver. 2. That the blood be reduced to its due temperament and mixture, leſt it ingender choler above meaſure, or render it unapt to be voided. 3. That the ſtrength may be ſuſtain'd, and the ſymptomes chiefly hurting them may be withſtood.

The 1. Indication.

1. That we may ſatisfie the firſt indication, cathartic evacuations notably conduce, as well by vomit, as ſiege, whereby the choler's deſcending towards the inteſtines may be furthered, and veſſels obſtructed, by the great ſhaking of them, freed from their obſtruction. 2. Sharp, bitter, ſalt medicines and others indued with a certain briskneſs ought alſo to be given, which provoke the motion of choler gathered in the Liver, and ſtagnating; hither alſo ought to be referred, what by ſimilitude of ſubſtance, and as it were ſignature, in as much as they are indued with a yellow juice, have the report to help againſt the Jaundies; notwithſtanding many of theſe may fitly be numbred under the ſame claſſis of evacuators, as the former, becauſe they move urine or ſweats.

The 2. Indication.

The ſecond indication altogether requires alteratives, *viz.* medicines which may depreſs the exaltations, or ragings of the Sulphur and fixt ſalt, and in the mean time provoke the reſtitution of the volatile ſalt depreſſed; for theſe ends remedies endued with an acid or volatile ſalt, beſides chalybeats do principally bring help; from hence ſpirit of ſalt, of vitriol, juice of Lemons, alſo ſpirit of Harts-horn, alſo dung of Sheep, and Geeſe, *crocus Martis* and diverſe other preparations thereof, are frequently uſed with ſucceſs in the Jaundies.

The 3. Indication.

The third indication vital ſuggeſts more and ſundry intentions of cure, procuring the ſtrength to be reſtored, and the removing the ſymptomes whereby it is prejudiced, all or the chief particularly to enumerate, and preſcribe would be a vaſt and tedious work; wherefore we will annex only certain general rules about diet, and ſome cordials and anodynes appropriate in this condition.

Forms of Remedies.

The curatory indications being appointed after this manner, it next lies upon us to acommodate the moſt ſelect medicines, *viz.* as well the ſimple as the compound, to theſe now propoſed intentions of curing, and to unfold the manner and reaſon of the operating of remedies which are accounted of ſpecial note in this diſeaſe. Therefore firſt we propound the forms of evacuating medicines appropriate in the Jaundies.

1. *Vomits.*

Vomits.

Vomiting medicines are frequently wont to help in the recent Jaundies, while the tone and ſtrength of the bowels are firm; in as much as they alleviate the ſtomach always oppreſſed in this diſeaſe with an unprofitable burden of viſcous phlegm; and moreover do free their infarctions by irritating the *vaſa choledocha*, and by much ſhaking all the paſſages of the Liver, and make eaſie the paſſage of the choler by the former accuſtomed ways.

Take of the infuſion of Crocus Metallorum half an ounce to ſix drams, Wine of Squils an ounce, Oxymel ſimple half an ounce, make a vomit to be taken with government.

Sometimes it is convenient to exhibite, the evening before, the following preparatory medicine for the eaſier vomiting.

Take of the powder of Aſarum roots, faculæ Aronis of each a ſcruple, of Tartar vitriolated half a ſcruple, of Oxymel of Squils an ounce, mix them.

Take of Sulphur of Antimony ſeven grains, Scammony ſulphurated eight grains, cream of Tartar half a ſcruple, make a powder, give it in a ſpoonful of panada.

Take nine Aſarabacca leaves, cut and bruiſed put them into three ounces of white wine, preſs out the liquor, let it be taken in the morning with regiment.

Take of Gambugia prepared eight grains, Tartar vitriolated ſeven grains, make a powder.

2. *Cathartick.*

Purgers. Purgers take place in this diſeaſe, be it recent or inveterate, *viz.* that as well a more plentifull ſtore of Excrements may be now and then withdrawn from the firſt paſſages, as that the *vaſa choledocha* may be excited to Excretions.

A Bolus. *Take of Electuary of juice of Roſes three drams, Rhubarb a dram, Salt of Wormwood, Cream of Tartar, of each half a Scruple, Syrup of Rhubarb, make a Bolus.*

Apozems. *Take of the roots of ſharp-pointed Dock prepared one ounce, the tops of Roman Wormwood, of Centaury the leſs, of each P. ij. Gentian and Turmerick roots an. two drams, yellow Saunders one dram, boyl them in a pinte and a half of Spring-water to a pinte, adding towards the end Senna ſix drams, the beſt Rhubarb three drams, Agarick a dram and half, Coriander-ſeeds two drams, White-wine two ounces, let them boyl cloſe two hours, after ſtrain it and clarifie it by ſettling; the Doſe from four ounces to ſix, with one ounce of Syrup of Rhubarb, the water of Earth-worms three drams; make a potion to be repeated every or every other day, for three or four dayes.*

In a weaker Conſtitution.

A Potion. *Take choice Rhubarb two drams, Agarick trochiſcated, half a dram, Cinnamon half a ſcruple, Ginger half a ſcruple, make an infuſion in White-wine and Cichory-water, of each three ounces, for three hours, in it ſtrained diſſolve one ounce of Syrup of Rhubarb, water of Earthworms two drams. Or Rhubarb from half a dram to a whole one, Salt of Wormwood a ſcruple, make a powder.*

Pills. *Take pil. Ruffi a ſcruple, Extr. Rudii half a ſcruple, make 4 Pills, take them in a morning with government, after 4 or 5 dayes repeat them.*

Deoppilative Medicines. In the third place follow Deoppilatives, which are alſo Diureticks, or Diaphoreticks, ſome whereof are accounted ſpecifick, by reaſon of ſimilitude of ſubſtance; Medicines of this ſort, both promote the ſeparation of choler from the blood, and urge the paſſage of it, being ſeparated, through the paſſages and pores in the Liver open but little. Moreover, in the mean time, by diſſolving the blood, they carry off the ſeroſities and cholerick recrements thereof, ſometimes by ſweats and urine.

Elixir. *Take of Elixir Proprietatis one ounce, take 20 drops in the morning, and at Five in the afternoon, with a convenient vehicle: after the ſame manner are taken, Tincture of Antimony, or of Salt of Tartar, and the ſimple mixture in a greater Doſe: for vehicles, Apozemes, diſtilled Waters, and Juleps for this Intention of curing are convenient.*

Apozems. *Take of the roots of Celandine the greater, ſtinging Nettles, Madder, of each one ounce, tops of Roman Wormwood, white Horehound, Agrimony, Germander, of each one handfull, Worm-ſeeds two drams, Shavings of Ivory and Harts-horn, of each two drams, yellow Sanders a dram and a half, Coriander-ſeeds two drams, boyl them in three pound of Spring-water to two pound, adding of White-wine four ounces, ſtrain it, and adde Syrup of Chichory with Rhubarb two ounces, water of Earth-worms, an ounce and a half, make an Apozeme, the Doſe four or ſix ounces twice in a day.*

Take of white Horehound dryed, Centaury, of each one handful, Gentian and Turmerick-roots, of each three drams, Cinamon one dram, Saffron half a dram, being ſliced put them into a Glaſs with two pound of White-wine or Rheniſh-wine; make an infuſion, the doſe three ounces.

To this we will adde *Geſners* famous Anticterícum.

Take of the roots of ſtinging Nettles a pound, Saffron one ſcruple, bruiſe them well, and draw off the tincture with White-wine, the doſe three ounces 4 or 5 dayes.

Empirick Remedies. Like to the former is that of *Fr. Joel. Take the Roots of Celandine the greater, two handfuls, Juniper-berries a handfull, bruiſe them and pour on them a pound of Rheniſh-wine, and draw out the juice, the doſe four ounces twice a day.*

The juice of white Horehound is mightily commended by Dioſcorides, *and the Syrup of the ſame by* Foreſtus, *for curing the yellow Jaundice.*

In

In lieu of an Elixir, and other chymical liquors, which to avoid nauſeouſneſs are to be taken in very ſmall quantity; to others endued with a ſtronger Conſtitution, Electuaries, Powder and Pills may be adminiſtred with better ſucceſs.

An Electuary.

Take of Conſerve of Roman Wormwood, of the yellow Rinds of Oranges and Limons, of each two ounces, Species Diacurcumæ one dram and half, powder of Ivory, yellow Saunders, of Lignum-Aloes, of each half a dram, Troches of Capers one dram, of Rhubarb half a dram, Salt of Wormwood two drams, with Syrup of Cichory with Rhubarb, make an Electuary, the doſe the quantity of a Cheſnut twice a day, drinking after it three ounces of the following Julep.

Diſtilled Waters.

Take of the greater Celandine-water, Fumitory, Wormwood, Elder-flowers of each five ounces, Snail-water, water of Earth worms, compound, of each two ounces, Sugar half an ounce, mingle them and make a Julep. Or,

Take of the roots of ſtinging Nettles, Angelica, Gentian, of each four ounces, the greater Celandine leaves and roots, ſix handfuls, Wormwood, Tanſie, Southern-wood of each four handfuls, the outer rinds of twelve Oranges and four Limons, prepared Worms and Snails of each one pound, Cloves bruiſed two ounces, being all cut and bruiſed pour upon them eight pound of White-wine, let them be diſtill'd in a cold ſtill, and the whole water mixt. Or,

Take of filings of Steel one pound, freſh Strawberries ſix pound, put them into a glazed pot, ſtirring them together, and let them ſtand a day, afterwards adde of Engliſh Rhubarb ſliced one pound, the rinds of four Oranges ſliced, pour upon them of White wine ſix pound, and diſtill them according to Art; let all the liquor be mixt together. The doſe of this and of the former is three ounces twice in a day after the Electuary or any other medicine.

Take of Turmerick-roots, Rhubarb, of each one dram and a half, the Bark of Caper-roots, of Aſarum-roots, of each half a dram, Extract of Gentian, and Centaury, of each one dram and a half, Salt of Wormwood four ſcruples, Water-creſs-ſeeds half a dram, of Rocket half a ſcruple, Elixir Proprietatis one dram, gum Ammoniacum diſſolved in the water of Earth-worms what will ſuffice to make a maſs, form it into ſmall Pills, the doſe is half a dram evening and morning, drinking after it three ounces of the diſtilled water.

Sylvius *his Empirical Remedies.*

Sylvius doth much magnifie for cure of the Jaundies, the Decoction of Hemp-ſeed in milk, and the ſolution of Sope, and from thence endeavours to eſtabliſh his own Hypotheſis (as we have above intimated) whereby he endeavours to deduce the Ætiologie of the Jaundies, rather from an alienation of the choler, than from the obſtruction of its paſſages.

The ſecond Indication.

Remedies againſt the Jaundies endowed with an animal volatile Salt.

2. The Second Indication reſpecting the altering or tempering of the blood, by which it may breed but moderately, and duly ſeparate the choler, requires Medicines of that ſort, which depreſs the Sulphur and fixt ſalt too much advanced. For theſe ends, I know not by what chance or conduct Medicines endowed with a volatile ſalt, as Worms, Snails, Millepedes, yea Lice, Dungs of fourfooted Beaſts, and Fowl, are brought into practice for curing the Jaundies, and not only preſcribed by Empiricks, but the more famous Phyſicians: Theſe ſometimes by themſelves, but oftener joyn'd with Purgers and Deoppilatives, become the chief Ingredients in Compoſitions againſt the Jaundies.

Fonſeca preſcribes Gooſe-dung gathered in the Spring-time and dryed, as alſo the white excrement of Pullets, of both which let the Powder be given in a convenient vehicle from half a dram to a whole one.

Various forms of them.

Take powder of Earth-worms prepared, of Gooſe-dung, of each three drams, Ivory, yellow Sanders, of each half a dram, Saffron one ſcruple, make a powder, divide it into ſix parts. One to be taken every morning with ſome appropriate liquor. To the Apozeme, or Antihecterical Tincture preſcribed above, Earth-worms, Gooſe-dung, *and alſo* Sheeps-dung *are profitably added.*

Take Millepedes freſh and alive from 50 *to* 100. *Saffron half a Scruple, Nutmeg a ſcruple, bruiſe them together, and infuſe them in Water of Celandine four ounces, of Earth-worms two ounces, expreſs them ſtrongly, and drink it: after this manner take it firſt once, then twice in a day for a week.*

The vulgar and Empirical remedy with us is, that Nine quick Lice be taken in a morning for five or ſix dayes, by which remedy they report to me many to be cured (whenas other remedies effected little) which truly can help by no other means than by reſtoring the volatile Salt depreſſed in the blood.

Alſo ſuch as are endued with a mineral volatile Salt.

Upon the ſame account of ſuccour even in this diſeaſe the flowers of Sal Armoniac, the volatile Salts of Amber, Harts-horn, Soot, in like manner their Spirits are frequently adminiſtred with great ſucceſs.

Take powder of Earth-worms prepared two drams, Species Diacurcumæ one dram, flower of Sal Armoniac half a dram, Salt of Amber a ſcruple, Extract of Gentian one dram, Saffron one ſcruple, Gum Ammoniacum diſſolved in water of Earth-worms what ſuffices, make a maſs, and form it into ſmall Pills; the Doſe is three or four, morning and evening, drinking after it three ounces of the Julep before preſcribed.

Take Spirit of Harts-horn tinctured with Saffron three drams; Doſe from 15 drops to 20. with the diſtilled water preſcribed above.

Steel remedies of ſeveral kinds.

In this Claſs of Medicines by which the icterical diſtempers of the blood are to be corrected, ſteel'd remedies do alſo challenge their place by right; for theſe afford notable help, not ſo much by unlocking the obſtructions of the bowels, as by depreſſing the rage of the Sulphur, and fixt Salt, and by volatilizing the blood, in the Jaundies, no leſs than in other cachectical diſtempers.

Wherefore, to the Decoction, or Tincture, or Infuſion above preſcribed, is properly added the filings of Iron, or the prepared powder thereof (its mineral conſiſtence being ſome wayes opened) or the vitriolic Salt extracted; from hence it is, that Medicinal waters heal even to a miracle thoſe ſick of the Jaundies, that had been deſpaired of; although theſe drunk in a very large quantity, inaſmuch as they paſs through all the veſſels, do alſo open the paſſages of the Liver, however ſhut up.

Therefore alſo even Preparations of Steel are added to the Electuary, Pills and Powders above recited, one while this, another while that, in due proportion. Moreover the Syrup thereof given twice a day to one ſpoonfull, in three ounces of Apozeme or water againſt the Jaundies; alſo tincture of Steel to twelve or fifteen drops may be adminiſtred in the ſame manner.

Outward and Sympathetick remedies againſt the Jaundies.

In the laſt place we may annex to this claſſis of altering Medicines thoſe things which not taken inwardly, but outwardly applyed, and by contact, uſed to the very urine of the Patient are held to cure this diſeaſe.

As to the former, a remedy often tryed by the vulgar, is a living Tench-fiſh, whoſe Scales and outer ſuperficies do reſemble a yellow colour, applyed to the right Hypochondria, or Stomach according to ſome, (to the ſoles of the feet, according to others) whence a ſudden flight of this diſeaſe is expected; hence although many promiſe themſelves a ſure cure, it hath often deceived me.

Another cure of the Jaundies at a diſtance is ſaid to be done by I know not what ſympathy or ſecret manner of working.

Take the freſh Urine of the Patient made at one time, of the aſhes of the Aſh-tree ſearced, as much as ſuffices to reduce it into Paſte, which may be formed into three equal balls, to be placed in a place ſhut, near the hearth or Stove; as theſe dry and harden, the Jaundies will vaniſh; after this courſe, I have known this inveterate diſeaſe happily cured, although reſiſting many other remedies; the practice thereof is very familiar with the Vulgar.

The reaſons of ſome of them.

If of a certain it could be made manifeſt that this effect doth for the moſt part happen, and the reaſon of it be inquired into; in the firſt place we ought to ſuppoſe a conſent or ſympathy of the ſpirits and other particles in the animated blood, with other ſymbols inmates of the freſh urine; and that they immediately are affected in the like manner with theſe. Notwithſtanding it is evident enough that a lixivial Salt mingled with urine, doth preſently ſet free the volatile ſalt formerly ſubdued or enwrapt in other particles; as is plainly ſeen in diſtillation of Urine, which if you urge by it ſelf with a ſand-heat, nothing but phlegm will ariſe; but adde the calx of Tartar, or Aſhes, immediately the Spirit and volatile Salt will come forth: wherefore, that Empirical adminiſtration being adminiſtred, at the ſame time, both in the Icterical urine, and alſo in the blood of the Patient, the volatile Salt eſcapes out of the power of the fixt Salt and the Sulphur, and for that cauſe the icterical

rical diſtemper of the Blood is put to flight. Alſo upon the ſame reaſon is built another ſympathetical cure of the Jaundies, whereof *Phil. Grulingius* and *Felix Platerus* do make mention, *viz.* the ſick party piſſing upon Horſe-dung while it is hot, hath cured many of the Jaundies; inaſmuch as the fixt Salt of the Urine, and thereby the fixt Salt of the icterical blood of the patient, is altered by the volatile Salt of the freſh dung, and reduced into its due temperature.

3. The third Curatory indication vital inſtitutes a convenient courſe of Diet, and moreover Cordials and Anodynes, of both which there is frequent need. *The Third Indication vital.*

As to what relates to the former, Food in this diſeaſe, more than in any other ought to be medicinal. For Vegetables and their parts, ſtyled commonly Hepatick remedies, are boyled in the broths of theſe Patients. And theſe alſo are wont to be made inſtead of other fleſh, of Worms, or Snails, (which are accounted Antidotes againſt the Jaundies.) Moreover Ale, and other ordinary drinks are impregnated with infuſion of Medicaments.

Take of the roots of ſtinging Nettles, of Strawberries, of each an ounce and half, Eringo-roots candied one ounce, Ivory and Harts-horn, of each two drams, Earthworms cleanſed twenty, a Cruſt of White-bread, Mace two drams, boyled in two pound of water to one pound, ſtrain it through Hippocrates *ſleeve, to which adde Diaſantalon half a dram, make broath, whereof take from four ounces to ſix, twice in a day: for ordinary drink, fill a Tub of four Gallons with Beer, after it hath wrought, put in the following Bag.*

Take the tops of Roman Wormwood, white Horehound dryed, of each two handfuls, the roots of ſharp pointed Docks ſix ounces, of the Bark of Aſh, of Barberries, of each 3 ounces, the outer Rinds of eight Oranges, and of four Limons, being ſliced and bruiſed, let them be prepared according to Art.

Since many ſick of the Jaundies are uſually affected with a great languiſhing, and frequent faintings of the Spirits, they have alſo need of cordial Remedies. *Forms of Cordials.*

Take of ſmall Aqua Mirabilis eight ounces, water of Earth-worms four ounces, Syrup of Orange-peels two ounces, mingle them, the doſe two or three ounces.

Moreover, they who are troubled with this diſeaſe, do very much ſuffer with pain ſometimes very troubleſome in the night, and are often obnoxious to waking; wherefore alſo Anodynes come into uſe for adminiſtration.

Take of Aqua Mirabilis, water of Earth-worms, of each one ounce, Diacodium ſix drams, Tincture of Saffron half an ounce, the doſe one or two ſpoonfuls late at night, if ſleep be wanting.

Take of Laudanum tartarizated two drams, Aqua Mirabilis two ounces, Syrup of Clove-gilly-flowers one ounce, mix them, the doſe is one ſpoonfull after the ſame manner.

SECT.

SECT. II. CHAP. II.

Of other Hepatick Remedies.

THe Liver is ſeldom or never found obnoxious to an Atrophie or extenuation, ſince truly it performs the office of a ſtrainer, and according to ſome, of a mingling bowel; but on the contrary by reaſon of many cauſes and occaſions, it runs the hazard of being encreaſed as to its bulk, and to be ſtufft and ſwell'd with divers things gathered therein, and with concretions. Hence no ſmall account of health conſiſts in this, that the Liver having right conformation may freely convey the blood every where, without keeping back too much Cuſtome or proviſion for it ſelf.

The Kinds of Remedies aſſigned to the Liver.

Truly many faults, and indeed not altogether undeſervedly, are imputed to this Bowel, as alſo unto the Spleen; the chief Kinds of which we ſhall touch upon. The Liver frequently and chiefly is wont to be faulty in one of theſe two, *viz.* Firſt that intercepting the nutritious juice appointed for other parts, it beſtows it to its own proper uſe; this is plainly diſcerned in Children affected with the Rickets, and moreover in many others that lead a ſloathful and idle life. Anciently there was an art with the *Romans* ſo to feed a Gooſe that the Liver prodigiouſly encreaſed might weigh more than the whole body. Secondly, the other fault of the Liver is, that it too eaſily receives all the excrements and feculencies whatſoever of the depraved Blood, brought into its inward receſs, and by retaining them there, doth not only grow large, but is obſtructed in its paſſages, whence frequently comes the Jaundies, or a Dropſie; it contracts alſo tumours and preternatural Concretions of divers kinds of matter.

Two general intentions of curing this bowel.

Many and divers diſtempers of the Liver ought to be referred to theſe two heads: of each of which it is not our purpoſe to inſtitute particular pathologies. As to what appertains to the general pharmacie of this bowel, there will be one principal ſcope of curing, that its income be diminiſhed as much as may be, or altogether cut off. Wherefore it will behove us to procure theſe two things, *viz.* That the Liver augment not above meaſure, by taking the nutritious juice too much unto it ſelf; and that it retain not the feculencies of the Blood, whereby it may be affected with obſtructions and preternatural Tumours.

It will be much eaſier to prevent than cure either of theſe faults of this bowel. For truly the former may be done, reſpect being had only that the blood be well conſtituted in its Temperament, and enjoying a free Circulation, it may both diſpenſe its nutritious juice to the parts, and eſpecially its outward parts, and driving forth all its excrements to the particular Emiſſaries, it may put them away there. And ſurely, the Medicines vulgarly called Hepaticks, do firſt and more immediately exert their power by purging the blood, rather than by correcting of the Liver: thoſe namely conſiſt of particles of ſuch a kind, which entering into the blood, and not mixing with it, do ſo ſtirre up the maſs thereof, and break it into pieces, that all the Coagulations and Concretions being taken away, all its dregs and impurities may eaſily depart, and being carryed to their proper Emunctories may be caſt out of doors.

Medicines vulgarly called Splanchnick, firſt and chiefly operate upon the blood.

For truly all remedies which are called Splanchnick, firſt work upon the blood, and incite its conſtitutive parts into a kind of effervеſcency, and ſo toſs, divide, and move them rapidly to and fro, that the vaporous effluviums being ſent into the habit of the body, the ſerous excrements into the Kidneys, the cholerick into the Liver, the melancholy into the Spleen, and others to other Emiſſaries for which they are fitted, may be ſhut out, without impediment or adheſion.

What ſuch they are which more eſpecially reſpect the Liver.

Wherefore the ſame Remedies which help the Liver, help alſo the Spleen, the Reins, the Lungs, and other the Bowels in their ſeparations; and for the moſt part move ſweating and urine. If any be found to reſpect one part before the reſt by any ſpecifick power, it is therefore becauſe their particles being more ally'd unto the excrements to be ſeparated within that bowel, and from thence aſſociated to them are conveyed thither together with them. For this reaſon Rhubarb, Turmerick, the greater Celandine, with many others adjoyned to the bilious humour, do the more eaſily reach the paſſages of the Gall, and are wont to ſuccour in the Jaundies. We have obſerved

before

before, the energies and manners of operating of Medicines of this kind. As to what appertains to the other, vulgarly called Hepaticks, firſt we will annex briefly certain forms of thoſe which are reported either to prevent or remove the unnatural augmentation of the Liver, and then thoſe which are held to provide againſt or take away the obſtruction and preternatural Tumours thereof.

1. Againſt the too much encreaſe, or improportionate nutriment of the Liver, firſt a more ſparing and thin diet, ſhort ſleeps, and moderate and frequent exerciſes are convenient: wherefore we preſcribe for Infants, and Children, when they are diſcovered obnoxious to this diſtemper, as in the Rickets, that they ſuck thin and ſerous milk, that they be ſhaken or toſſed in their Nurſes arms, and tumbled quickly to and fro, or be carried ſwiftly in a Chair or Coach, and as ſoon as may be, learned to go and to uſe their feet.

Some forms of Hepaticks.

Take of the water of Snails, of Earth worms, of each three ounces, Syrup of Chicory with Rhubarb two ounces, ſpirit of Sal Armoniac with Gum Ammoniacum one ſcruple, mix them, and take a ſpoonfull evening and firſt in the morning.

Take of the roots of Maleferne, Chervil, candied Eringoes, of each one ounce, the leaves of Agrimony, Harts-tongue, male Speed-wel, of each one handful, Shavings of Ivory, Harts-horn, of each two drams, white and yellow Sanders, of each one dram, Raiſins ſtoned one ounce and a half, Barly three drams, boyl them in three pounds of Spring-water to two, to it ſtrained adde of Snail and Earth-worm water, of each one ounce and half, Syrup of Chicory two ounces, make an Apozeme, take two or three ounces in a day.

Take Powder of white and yellow Sanders, Crabs-eyes, Lignum-Aloes, of each half a dram, Salt of Wormwood one Scruple, make a powder, the doſe half a Scruple to a whole one twice a day.

Take Empl. Diaſaponis, Cerate of Sanders, of each what will ſuffice, make a Plaiſter to be applyed to the Hypochondrion.

Take Unguentum Splanchnicum two ounces, Oyl of Wormwood one ounce, mixe them, and make a Liniment for the region of the Liver.

Hither many other methodical as well as Empirical Medicines being uſed for the Rickets may be referred, but we haſten to other things.

Their numbers enumerated.

2. Remedies ordained for moſt other diſtempers of the Liver are either ſimple or compound. Very many of the former ſort are reckoned by Authors, as if they were procreated for this particular uſe. *Heurnius* ſays, *That God Almighty hath offered to the World the greater plenty of Remedies of this kind, by reaſon of their notable neceſſity.*

Firſt Simples.

And to this Rank may be referred in the firſt place all kinds of Chichories, the Sorrels, the ſharp pointed-Docks, and almoſt all Vegetables endowed with bitterneſs and ſomething of ſharpneſs, (wherein the deoppilative vertue is reported to conſiſt) as Wormwood, Germander, Ground-pine, Fumitory, Tanzy, Agrimony, Liverwort, Lignum Aloes, all the Sanders, Tamarisk-bark, and Aſh-bark, the roots of Capers, with many others, which commonly make up the greateſt part of Herbals; ſo that whilſt the Liver like a certain Goddeſs ruled ſanguification, very many Medicines were uſed to be aſcribed for its ſafeguard and ſuccour.

The fixt Salts of herbs, the acid Spirits of Minerals drawn by diſtillation, belong by right to this number, as they do chiefly exagitate the maſſe of blood, diſſolve the Concretions thereof, diſpatch their obſtructions, and cauſe it every where to be paſſable, as to all the parts thereof.

Chalybeates.

If I here omit Chalybeates, moſt Chymiſts will cenſure me very unjuſt to the Liver; for truly as the Prerogative of *Venus* is vulgarly attributed to this bowel, ſo as to conſtrain to Love, we may hence expect that *Mars* will be perpetually kinde unto it. And really it is manifeſt by Reaſon, as well as Experience, that Preparations of Steel are convenient in hepatical affects, as chiefly in the Jaundies, and oftner in the Dropſie; wherefore theſe are put into the Receipts of the Ancients and modern, and among curatory Compoſitions. For what reaſon the Preparations of Steel as in like manner the medicinal waters from Iron, as well natural as artificial, do purifie the maſſe of blood, and by conſequence do relieve many diſtempers commonly call'd Hepatical, is ſhewn by us largely enough in another place, ſo that here is no need for repetition.

Medicines that are appointed by Phyſicians for the Liver are divided into various

ous forms, but firſt into hot and cold, and alſo into moiſt and dry; accordingly as the temper of this bowel is ſuppoſed to conſiſt after divers manners: when in truth it is only a dyſcraſie of the blood, which being ſo diverſly faulty, deſires ſo various an energy of medicines. Neither is it a leſs vulgar error, that in the eſtimating of mens conſtitutions, the various temperament of every one due to the blood, is aſcribed chiefly to the Liver, as hot or cold, or otherwiſe diſpoſed.

The Shop-compoſitions of Hepaticks.

In the Antidotaries of the Ancients there are many Shop-compoſitions extant, which ſeem to be deſigned for the Livers ſake only, of which ſort are *Rhaſis* his Electuarie of the droſs of Iron, *Crocus ferri* of *Balchuſis*, which being mixt with Treacle is commended for hepatical affects; the *ſpecies Diatrion ſantalon*, *Diarrhodon Abbatis*, *Trochiſcs* of *Rhubarb*, *of Agrimony*, *of Capers*, *Diacurcuma*, *Dialacca*, *Syrup of Wormwood*, *Cicorie*, *of the five roots*, *Byzantinus*, with many others, unto all whoſe forms, a vaſt Catalogue is annext for curing all the diſeaſes of the Liver. But theſe paſſed over, it pleaſes me now to propound ſome Kinds and Examples of Medicines which are counted deoppilative according to the practice of the Moderns.

Therefore for an opening Decoction,

Magiſtral Compoſitions.

Take of the roots of Ferne, Chervil, ſtinging Nettles, Dandelyon, of each one ounce, the leaves of Agrimony, Harts-tongue, Speed-well, Oak of Jeruſalem, *Liver-wort, of each a handfull, white and yellow Sanders, of each three drams, Ivory half an ounce, red Cicers an ounce, Coriander-ſeeds three drams, Raiſins two ounces, boyl them in four pound of water to two pound, adding towards the end White-wine four ounces, ſtrain it through* Hippocrates *Sleeve, to which adde Species Diarrhodon Abbatis one dram, of our prepared Steel two drams, Syrup of Chicory with Rhubarb two ounces, the Water of Snails and Earth-worms, of each one ounce, the doſe ſix ounces twice in a day after a doſe of the following Electuary.*

Electuary.

Take of Conſerve of the yellow of Oranges and Limons, of each two ounces, of Wormwood and Fumitory, of each one ounce, ſimple Powder of Aron-roots, yellow Sanders, Lignum Aloes, of Caper-roots of each one dram and a half, Crabs-eyes one dram, Salt of Wormwood two drams, ſyrup of Fumitory what ſuffices, make an Electuary, the doſe the quantity of a Walnut twice in a day, drink after it a draught of the Apozeme now preſcribed, or of the following diſtilled water.

A diſtilled Water.

Take the leaves of Wormwood, Centaury, Tanſie, both ſorts of Southern-wood, Tamariske, of each four handfuls, of green Walnuts four pound, of Aſhen keyes green two pound, the Rinds of ten Oranges and four Limons, Snails and Earth-worms prepared, of each one pound, all being ſliced, pour on them of White-wine eight pound, diſtill it in a cold Still, let all the liquor be mixt together, the doſe three ounces, ſweetning it with Sugar or a fit Syrup.

If a form of Pills will pleaſe better, the enſuing Extract called in the Shops *Extractum Ecphracticum*, ſeems profitable.

Pills.

Take of white and clear Tartar, and of freſh Filings of Iron, of each 4 ounces, let them be ground together into powder, after boyl them in Fountain-water from four pound to two (ſome uſe White-wine) to the ſtrained liquor adde the tops of Centaury, of Roman Wormwood, of Carduus, of each one handfull, Gentian-root half an ounce, Species Diacurcumæ an ounce and half, let them boyl ſhut cloſe for three or four hours, ſtrain it, and evaporate by the heat of a Bath to the conſiſtence of Pills, adding roots of Rhubarb or Species of Hiera Picra *two drams; the doſe is from one ſcruple to half a dram made into Pills, in the evening, with an appropriate vehicle.*

For the ſame intention, *viz.* to prevent or to remove the obſtructions of the Liver, a medicated purging Ale, to be taken many dayes in Spring and Autumn, is by ſome very much magnified, and exactly obſerved every year during their lives.

Take of the roots of ſharp-pointed Docks prepared, Polypodie of the Oak, of each 3 ounces, Madder-roots two ounces, Engliſh Rhubarb two ounces, of leaves of Senna four ounces, Epithymum two ounces, yellow Sanders one ounce, Carthamus and Coriander-ſeeds, of each one ounce and a half, ſlice them and bruiſe them according to Art, make a bag for 4 gallons of Ale, after ſix dayes let him take to 12 ounces more or leſs in the morning, expecting four or five Stools without regiment.

SECT.

SECT. II. CHAP. III.

Of Remedies for the Dropſie called Aſcites.

AFter the Jaundies and the Remedies thereof, our method leads us to treat of a Dropſie; not becauſe of the Vulgar opinion, that it always ariſes from the fault of the ſame bowel; but becauſe that former diſeaſe having long continued, for the moſt part concludes in this: which happens ſo, not ſo much from the fault of the Liver, as from the whole Blood, for this and not that perform ſanguification. Wherefore, when the maſſe hereof hath for a long time been filled with cholerick excrements, and at length degenerating from its temper, accumulates alſo watery humours, then doth a Dropſical Diſpoſition come upon the Jaundies.

The more remote cauſes of an Aſcites.

But whereas three ſorts of Dropſies are vulgarly ſuppoſed, viz *Aſcites*, *Tympanites*, and *Anaſarca*, we will at preſent handle only the two former, appertaining to the Splanchnick or Pathologie of the nether Belly. And firſt what relates to an Aſcites, this diſeaſe as to its matter and formal reaſon is manifeſtly known by the ſign of even many ſenſes together, *viz.* it is a Tumour of the Abdomen, from a wateriſh tumour contained within the cavity thereof. The water making this tumour, ſometimes encreaſes to a huge inundation, and ſcarce credible quantity. I have once ſeen a Tub would hold 15 gallons filled with water taken out of the Abdomen of a woman dead of a Dropſie. But whence that humour proceeds, alſo by what manner, and from what cauſes it gathers together in the belly firſt, and afterwards is ſenſibly augmented; and laſtly by what paſſages, and by what vertue and operations of Hydragogue Remedies, it may again be taken from thence, and evacuated, ſeems moſt difficult to be unfolded.

First in reſpect of blood.

As to the former, *viz.* the encreaſe of water, ſome have thought it to deſcend from the Liver, and others from the Spleen diſtempered, into the cavity of the Abdomen; and ſo this bowel or that being vitiated, always to be the cauſe of an Aſcites. But that this is otherwiſe, Anatomies of many dead of this diſeaſe, do manifeſtly declare: when after the inundation of the belly, the Liver and Spleen are found often without fault. And truly theſe bowels do not ſeem the Springs of any ſuch illuvies, being endowed with no cavityes, wherein waters might be accumulated together: wherefore the origine of an Aſcites, as of a ſtanding Pool or Lake, is to be derived from a River, or at leaſt a glutt or inundation of ſome Humour.

It doth not always proceed from the Liver & Spleen.

The humours that flow within the paſſages, or Veſſels as Brooks, are chiefly theſe three, *viz.* the Blood, the milkie Humour, and the Lympha. The ſhowering or diſtilling of water may come to paſs from the nervous Liquor which ſometimes ſlowly and inſenſibly ſweats out of the fibres and membranes, and from vapours condenſed within the hollowneſs, or ſome Cavity of the Body. Whether by theſe wayes an Aſcites doth rather, and oftener proceed, we will now ſearch.

The humours by which it is produced are,

And in the firſt place as to what relates to the blood, it is without doubt, the Serum falling from the maſſe thereof, too much diſſolved, as it doth excite Fluxions and Catarrhs of various kindes, ſo it ſometimes ſtirs up the greater illuvies of waters, *viz.* Dropſical: wherefore when an Anaſarca proceeds altogether from this cauſe, and when oftentimes an Aſcites comes upon that diſeaſe not immediately healed, we may well enough inferr that either diſtemper is induced from a watery humour, every where poured out from the little mouths of the Arteries. Moreover, it is not much improbable, that the Serum of the diſſolved Blood is firſt and ſolitarily poured out of ſome end of the Cœliac and Meſenteric Arterie being open into the Cavity of the Abdomen, and ſo brings on an Aſcites without an Anaſarca going before; and ſo eſpecially if perhaps it happen, that ſcirrhous Tumours, Ganglion's, little ſwellings, or preternatural Concretions of another manner, are firſt raiſed about the Meſentery, the Spleen, the Liver, the Womb, or any of the other bowels of the nether belly: for, becauſe the Circulation of the blood is hindred in thoſe places, that the blood being carryed through the arteries, may be ſome way brought back, the ſerous part being thruſt out from its company, falls into the cavity. For truly it is moſt evidently manifeſted, that it ſo comes to paſs, by this Experiment mentioned by us in another place, *viz.* If in a living animal, the jugular veins being taken up and bound

First the Blood.

with a thred, the reduction of the blood be ſtopt, the whole Region of the head ſwells in a ſhort ſpace, with a water between the skin, and clearly hydropical. And truly I have more frequently obſerved that an Aſcites hath followed upon ſecret tumours gathered and raiſed in ſome place in the lower belly: which certainly happens for the reaſon above recited. When the courſe of blood being obſtructed, the watery part is extravaſated in a ſhort ſpace, that humour is not meerly ſerous, but beſides, the nutritious Liquor, ordained to nouriſh all the ſolid parts, is emptyed into the belly: wherefore, while this Region ſwells up, the members are extenuated, and the Lympha taken out from an Aſcites, with heat thickens and grows white, like the white of an Egge.

2, & 3. The milkie and watery humour.

It is alſo very probable, that the milkie Veſſels being burſt aſunder, pour out their humour into the cavity of the abdomen. Truly the moſt renowned *Sylvius* thought this diſeaſe moſt frequently engendred from ſuch a cauſe. And truly as out of the milkie or watery Veſſels, *viz.* one of them or both together, being divided, or opened, we may well ſuſpect the illuvies of water or chyle ſometimes to overflow the bowels of the nether belly; ſo the following obſervation ſeems to confirm the ſame thing. Of late one that had been long ſick of the Jaundies, and in the mean time temperate and abſtemious of drink (to which he was not prompted by thirſt) contracted an Aſcites, increaſed in a ſhort time hugely. After that medicines were adminiſtred in vain, a Paracenteſis is attempted according to the manner of *Sylvius*, with a hollow Needle; out of the orifice, not icterical water, but limpid and thin flowed out abundantly; from whence we may inferre, that hydropic humour flowed not out of the maſs of blood, for then it had been coloured, but diſtill'd out of the lymphic or milkie veſſels into the cavity of the abdomen. We have joyn'd together as akin the ways of the milkie and lymphic Veſſels in propagating an Aſcites, becauſe both veſſels do convey the chyle, or what is analogous to it, to the common Receptacle; and many branches or leading Pipes of either kind, are diſtributed about the bowels of the nether belly; in the mean time, it is not improbable but that a ſolitary fault of either veſſel may ſometimes produce an Aſcites.

As to the other ways of generating an Aſcites, propoſed in the beginning, I am ſcarce induced to think, ſuch an inundation of the belly can eaſily ariſe from the diſtilling of a nervous humour, or by reaſon of vapours there condenſed: although perhaps in a Tympany where the cavity of the abdomen is enlarged, and tranſpiration hindred, the effluvia that were wont to exhale, being forced inwards, are changed into Lympha or water, wherefore for the moſt part an Aſcites is ever conjoyn'd with that diſeaſe.

An Aſcites often the product of the Jaundies.

The immediate or conjunct cauſes of an Aſcites being deſign'd after this manner, which indeed ſeem to be, either a watery humour poured out of the Veſſels bringing Blood, or Lympha or Chyle poured out of the proper paſſages of them both; now we muſt in the next place inquire about the more remote cauſes of this diſeaſe, *viz.* for what occaſions, and after what manner, the veſſels affected of either ſort depoſite their burdens into the cavity of the belly.

The kinds of a Dropſie.

Firſt therefore, that the watery part of the blood ſweats out into the *Aqualiculum* or belly, either the very Blood, or Veſſels containing it, or both together, are in fault. The Blood is in fault, when being depraved in its Craſis it doth not rightly contain within its conſiſtence the conſtitutive parts, but being apt to be diſſolved, it every where rejects its ſeroſities from the mixture; which either it drives out by Urine or Sweat, or permitting them to reſide within, pours them out into the pores of the fleſh, or the cavity of the bowels. The veſſels bringing blood grow faulty for a ſecond reaſon, for that their extremities or little mouths either are too much looſe, or altogether ſhut up. In the former ſtate the clew of Circulation of blood is not entirely and firmly continued; but the thinner and more crude part of the blood being apt to depart, is ſuffered to flow out near to the interſpaces or inoſculations of the Arteries and Veins; likewiſe on the other ſide, when the courſe of blood is hindred, by reaſon of a tumour or obſtruction of ſome veſſels, their little mouths being throughly cloſed; to this being ſo ſtraitned that a paſſage may be made open by ſome means, that which is thin and watery is extravaſated, and ſent away into the neighbouring places, as we have ſhewed above.

The Deſcription of an Aſcites.

2. In reſpect of the Lympha-ducts.

2, & 3. But an Aſcites beginning alone, doth often ariſe, by reaſon of the milkie or lymphatic veſſels being depraved; wherefore ſeeing we ſuppoſe the cauſe of this kind of diſeaſe to be oftentimes conjunct, we muſt enquire, by what means, and for what occaſions, theſe veſſels are wont to be ſo opened or burſt aſunder, that they pour out their Liquor into the cavity of the belly.

Firſt

Firſt therefore as to what belongs to the Lymphaducts, theſe veſſels may be in fault after a diverſe manner, but chiefly, either that being obſtructed or compreſſed near their origine, they do not receive the humour, or being burſt about the middle or extream parts, do pour it out into the belly. There are many cauſes and reaſons of effecting of either of theſe, for it may be a viſcous matter obſtructs their beginnings, or glandulous, ſcirrhous, and other preternatural Tumours compreſs them, as alſo a vaſt inundation of Lympha flowing out, moreover vehement motions of the Body, or paſſions of the mind, may burſt them aſunder.

3. In reſpect of the milkie veſſels.

2. The milkie Veſſels, no leſs than Lymphatick, are in danger to be broke, and ſo by pouring out their liquor into the cavity of the Belly, do excite the Dropſie called Aſcites; and truly they are wont to be hurt for the like reaſon, in regard their middle paſſages, or their ends, either are obſtructed by a more viſcous chyle brought into them, or by Phlegme from the inteſtines, or they are compreſſed by Tumours bred in the Meſenterie: for forthwith the chyle entering into the beginnings of the veſſels, and not finding a paſſage, firſt very much diſtends them, and afterwards breaks them. There are many cauſes and occaſions, for which the thicker and obſtructing humours are driven forwards into the milkie Veſſels; for beſides an irregular Diet, and for the moſt part from meats hard to be digeſted, this evil is frequently cauſed by too much drink, or immoderate exerciſe immediately after Food, alſo from cold drink while the Bowels are very hot; for ſo the paſſages of the Veſſels before gaping are ſuddenly ſhut, and afterwards more narrowly cloſed, wherefore the chyle ſticking within their ſtraitned chanels, doth throughly fill and obſtruct them in a ſhort ſpace.

The differences of this diſeaſe.

As to what belongs to the differences of this Diſeaſe, beſides them already cited, *viz.* that it comes after an Anaſarca, or comes ſolitary; that this alſo is manifold and after a diverſe manner, according as the Veſſels bringing blood, or water, or milk, are found in the fault; Moreover we obſerve, that the Dropſie called Aſcites ſometimes proceeds from a meer watery humour filling and diſtending the parts of the nether belly; but ſometimes there happens to this deluge an extenſion of the membranes, or inflations made by the irregularities of the inmate ſpirits, and ſo they do encreaſe the ſwelling of the Abdomen; and in this caſe a certain Tympanites comes upon an Aſcites, even as more frequently on the contrary, this is the offſpring of that.

Moreover, in an Aſcites meerly watery, ſometimes the Lympha only fluctuates within the Cavity of the Abdomen, ſo that in the mean time the bowels being ſoakt in it, continue ſtill entire, and little or nothing encreaſed in their bulk; but ſometimes beſides the inundation of the Lympha in the hollow of the belly, the blood being ſlowly circulated there, and almoſt ſtagnating it is much diluted with water; Moreover the Parenchyma of the bowels, and the ſides of the Veſſels and of the membranes, and chiefly the Glandules every where numerous, being moiſten'd, do ſwell with the flowing water, and ſo the tumour of the belly conſiſting as it were of many pools of water and mooriſh Contents, riſes into a vaſt bulk.

The Prognoſtick.

The Prognoſtick of this Diſeaſe, is always ſuſpected and accounted of an ill omen: for none of the vulgar but will pronounce the obſtinate tumour of the belly to be very dangerous and difficult to cure: If any ſeem to be affected with a Dropſie, or a Conſumption, with them preſently the next queſtion is, Who ſhall be his heir.

An Aſcites beginning after an Anaſarca (which proceeds commonly from the whole maſs of blood being pour'd forth into ſeroſities, and ſweating them out of the little mouths of the Arteries into the cavity of the Abdomen) is accounted of eaſier cure, or at leaſt of more promiſing hope, than that ſolitary diſeaſe coming from tumours about the bowels, or from the Lymphatick or lacteal Veſſels being burſt aſunder; for as well the conjunct as procatarctick cauſe of the former Diſeaſe, oftentimes is uſed to be removed wholly, or in part; but in the other caſe, both for the moſt part exiſt incurable. A reddiſh Urine, lixivial, and little, in an Aſcites is of ill ſignification, for 'tis a ſign that the maſs of blood, being repleated with a ſcorbutick Salt and Sulphur boyled together, is too much bound up in its ſubſtance; inſomuch that it doth not well ſeparate the feculencies, nor diſcharge them by fit and convenient Sinks, which notwithſtanding it doth evilly diſpoſe by conſtraint into the Cavity of the Belly, foraſmuch as it is hindred in its Circulation in the very ſame place. For in an Aſcites the blood is not always diſſolved as in an Anaſarca, but ſometimes appears too much compacted in its temper, yet ſo, that the ſalt Serum being denyed to the pores of the skin,

and to the Urinary paſſages, by reaſon of the Obſtructions of the bowels is forced to break out within the abdomen.

If in an Aſcites, by a Purge taken, the waters are evacuated with eaſe plentifully by ſtool, and from thence the ſwelling of the belly is ſomewhat diminiſhed, we are not to deſpair of the Cure; but if Purgers bring out little or nothing of the Serum, or Lympha, and thence by reaſon of the Nervous fibres being irritated, and driven into extenſions or inflations of the bowels and membranes (as it uſes frequently to be) the belly ſwells the more, and grows like a Drum, we may expect only a fatal event of the Diſeaſe.

The Cure of an Aſcites.

About the curing of the Dropſie called *Aſcites* it behoves us chiefly to conſider by what ways the waters heaped within the abdomen, may be thence brought out, and evacuated, for ſuch an evacuation ought to be attempted only by poſſible ways. And here preſently is to be obſerv'd, that the remedies uſed for Hydragogues according to the ordinary practice of Medicine, intend to accompliſh that end by purging, by Urine, by Sweating, and by inſenſible tranſpiration: In ſome caſes of the Sick you ought to proceed by this way, and in other caſes rather by that way, or another, and if none of theſe ſeem feaſible, or ſucceed well, let mature conſultation be had for a Paracenteſis. It will be worth our labour to weigh every of theſe kinds of Medicines, and the reaſons of every one, and the manner of their operations, and with how much vertue Hydragogues are endowed.

By what and how many remedies the eduction of the water is to be endeavoured.

Firſt by purging.

Firſt, therefore as to what relates to purging, we have in another place ſhewed that, from the irritation of the Phyſick made in the belly and guts, as well the Contents and winde of theſe bowels, as moreover the humours driven into their Coats and Glandules, and which are heaped up in the Veſſels and Pipes of the neighbouring parts, are diſquieted, and partly ſtreined into the paſſages of the guts, and partly returned into the maſs of blood; inſomuch that the tumour of the abdomen ariſing from the ſtoppage, and as it were a wateriſh affection of thoſe kind of Parts, is often abated by Purgatives ſeaſonably adminiſtred, and ſometimes wholly removed; but it doth not ſo ſucceed when it proceeds from a Lympha fluctuating within the cavity of the abdomen, or from an inflammation of the membranes, or from a tympanitic extenſion: becauſe Hydragogues do little or nothing bring out thoſe waters, and if they be of the ſtronger ſort, they encreaſe this paſſion and exaſperate it by inflaming the part.

Catharticks are either Vomits or Purges.

Catharticks uſed for Hydragogues, are either Vomits, or Purges; they exert their power in the ſtomach, and theſe rather in the Inteſtines; inſomuch that they powerfully provoke and twitch the Nervous fibres; and together pour forth the blood and nervous liquor by a certain ſeptick force, and do cauſe the ſerous humours wherever impacted to be ſtirr'd, and do cauſe them plentifully to be ſent away by the paſſage granted. Either are reckon'd of a various kinde, *viz.* either ſimple or compound, gentle or ſtrong, by the Ancients as well as by the Moderns; ſome of which that are moſt chiefly noted, we will here briefly obſerve.

1. *Emetick Hydragogues*, chiefly famous, are Gambugia, Eſula, Spurge, and their ſeveral Preparations, as alſo the *Hercules* of *Bovius*, and the *Pilulæ Lunares*.

The chief medicines of either kinde.

2. *Purgers* are Elder, and Dwarf-Elder, Soldanella, Gratiola or Hedge-hyſſop, the Juice of Orris, and Elaterium. We will briefly preſcribe ſome methods either of preparing or compounding or adminiſtring each of theſe.

1. Gummi guttæ.

1. *Gambugia*, firſt an *Indian* Medicine, being from thence brought by our Countrey-men, from the Painters Shops coming to the Apothecaryes, began to be in uſe, and is much magnified for purging out ſerous humours. But foraſmuch as taken by it ſelf it vehemently diſturbs the Stomach, and often weakens it, therefore, that its outragious and violent vomiting force may be ſomewhat abated, there are divers ways of its Preparation invented; but truly it is beſt corrected with an acid Spirit, or with an alcalizate Salt, or by throughly mixing and correcting it with aromaticks.

Its various Preparations.

Adrian à Mynſicht, extolls the magiſtery thereof, which is made by a diſſolution in Spirit of Wine, and after drawing it off, and precipitating it with Spring-water; alſo diſſolving it with Spirit of Wine vitriolated, and with Tincture of Roſes, and red Sanders, and after by evaporating it: others prepare it with the fume of Sulphur after the manner of Scammonie ſulphurated; others grinde it on a Marble, moiſtening it with Oyl of Cinnamon, or Cloves, or other chymical Aromaticks. I uſe moſt the *Solution thereof made with a tincture of Salt of Tartar, the doſe from 15 drops to 20 or 30.*

Take of Gum-gutta, gr. 6. Mercurius dulcis gr. xv. Conſerve of Violets, a dram and a half, make a Bolus. *The forms of Hydragogues prepared thereof.*

Take of Gambugia twelve grains, Salt of Wormwood fifteen grains, Oyl of Mace one drop, Conſerve of Damask-Roſes one dram, make a Bolus: and it is wont to be given with Tartar vitriolate, or Cream of Tartar, and powder of Rhubarb.

Take of Gum-gutta ſulphurated, or vitriolated, fifteen grains, Cream of Tartar half a ſcruple, Extract of Rhubarb one ſcruple, Oyl of Cinnamon, gut. 2. make 4 Pills.

Lately, a woman afflicted with a moſt painfull Aſcites, and moſt deſperate, as it ſeemed to me, the enſuing Medicine being taken for 6 days ſucceſſively, ſhe began to be much better, and in a ſhort time afterwards recovered her health entirely.

Take of powder of Gum-gutta twelve grains, Oyl of Cinnamon one drop, with ſyrup of Buck-thorn, make a Bolus, the doſe daily to be augmented, aſcending from twelve grains to twenty.

Take of our Tincture of Gum-gutta one ſcruple, water of Earth-worms one ounce, Syrup of Rhubarb half an ounce, mix them, and let it be taken with government.

2. Whereas there are ſeveral ſpecies of Spurge, or *Tithymalus*, and all of them work more violently either by Vomit or Stool, by reaſon of the notable provocation they make in the bowels; and for that cauſe do abundantly bring out ſerous humours; yet by reaſon of the too outragious force of many of them, the leſſer Spurge for the moſt part only is now in uſe, and the preparations thereof moſt of all magnified are, the powder of the bark of the Roots, and the Extract, and we think fit to adde the tincture inferiour to none of the reſt. *2. Spurge. The Preparations thereof.*

Take of Spurge with the Roots cleanſed four handfuls, Lignum-Aloes, and Cloves, of each one dram, bruiſe them and boyl them in four pound of Spring-water, to half, the ſtrained Liquor clariſie by ſeparation or ſettling in a long glaſs, afterwards evaporate the clear liquor in a Bath heat, to the conſiſtence of an Extract, the doſe one ſcruple.

Take of this Extract half an ounce, pour upon it into a matraſs of the Tincture of Salt of Tartar 6 ounces, digeſt them in a Sand-bath to the Extraction of a Tincture, the doſe from 20 drops to 30 in a convenient vehicle. *Forms.*

Take of the Powder of Spurge from ſeven grains to ten, Cinamon half a ſcruple, Salt of Tartar eight grains, mix them together in a glaſs mortar, give it by it ſelf or mixed with a fit Conſerve, or Syrup, make a Bolus or Pills.

2. *Precipitate* of Mercury with Gold, or the *Hercules* of *Bovius* which is much extolled by the Author for curing Dropſies; it is deſcribed in a former Treatiſe in the Chapter of Vomits, and the manner of preparing, and the working thereof, and the Reaſons are there delivered. This Medicine, inaſmuch as it twitches the ſtomachical fibres by its acrimony, and pours out the blood by reaſon of the mercurial and ſalt particles, cauſes or ſtirs up a fierce Vomit, and thereby cauſes the ſerous humours, violently ſtrained into the Cavities of the bowels, to be ejected. *The* Hercules *of* Bovius.

3. The Pills called *Lunares* produce the ſame effect in like manner, by reaſon of the vitriolate particles of Silver ſharpened with other ſaline menſtruums, *viz.* by wrinkling of the fibres of the Bowels very much, they force the ſerous humours to be ſtrongly ſtrained into their paſſages, and ſo to be evacuated. *Pilulæ Lunares.*

A Solution of Silver made in Stygian water, and well cleanſed, and by a little evaporation is reduced into pleaſant Cryſtals, which by themſelves (or with an addition of Salt Nitre to abate the fierceneſs of the Lunar Vitriol) are made into Pills with crums of bread: the doſe is one Pill, ſometimes two or three, reſpecting the ability of ſtrength and working. Medicines of this kinde are exhibited ſometimes with ſucceſs in a ſtrong conſtitution, and bowels ſtrong, and a good habit; but they are ſcarce ever conveniently or rarely without prejudice taken by tender and cachectical perſons.

Hydragogues meerly or chiefly purging, are either of a more mild ſort, as Elder, Dwarf-Elder, Soldanella, and juice of Engliſh Orris, which ſeldom being adminiſtred by themſelves, do want the ſtirring up of ſharper Medicines, and on the other ſide they blunt their too much fierceneſs; or they are of a ſtronger ſort, as *Gratiola* or Hedge hyſſop, Jallap, and Elaterium. *Purging Hydragogues.*

The

Elder and Dwarf-Elder. The ſeeds or grains of Elder and Dwarf-Elder being dryed, are reduced into a powder, which being taken to the weight of one dram, doth gently bring forth ſerous humours by ſiege; Water and Spirits are diſtill'd of the juice of either ſorts of Berries fermented, alſo Robs and Syrups are made of them; which with many other Preparations of thoſe Vegetables, are much magnified for all hydropical Diſtempers.

Soldanella. *Soldanella* and *Gratiola*, are rarely uſed by themſelves in our age, neither are any neat and very efficacious Medicines prepared out of thoſe Simples; they are frequently mixt with certain other Hydragogues, and chiefly are ingredients in compounding Apozems.

The juice of Orris. The Juice of *Engliſh Orris* is a very profitable Medicine, and becauſe to be eaſily procured for the poor, is the more to be eſteemed: It is given from ſix drams to an ounce and a half, or two ounces, either by it ſelf in a fit vehicle, or with other things appropriated thereunto. Jalap is a moſt known Medicine againſt every Dropſie, and common enough. Any one of the common people ſuffering under that diſeaſe, preſently takes of the powder of the root of Jalap a Pennyworth, mixt with Ginger and White-wine, and the deſired effect doth frequently follow this remedy uſed with intermiſſion.

Elaterium. *Elaterium* is rightly eſteemed the moſt powerful Hydragogue, for that it moſt painfully provoking the ſplanchnick fibres and together melting the blood and humours by a certain corroſive force, compells whatſoever ſeroſities the Coats of the Bowels, Membranes, Veſſels, alſo the Glandules, and fleſh do contain in themſelves, to be poured out into the cavities of the Stomach and guts: by which Medicine happily working, the aſſwaging of the Abdomen doth ſometimes ſucceed. Truly this is the chief weapon of the Empirical Magazine againſt any Aſcites; which they notwithſtanding uſing in all caſes, do oftener adminiſter to the hurt than benefit of the Patient: the doſe is from three grains to ten or fifteen, taken either by it ſelf, only with correcting ſpices added, or it is given with other hydragogues in form of a Powder, Pills, or Electuary. The tincture and eſſence of it are extracted with Spirit of Wine, or with tincture of Salt of Tartar.

The forms of Hydragogues. Theſe are the chief ſimple Hydragogues, from which being prepared with the addition of others, many compounded ones as well Magiſtral as common in Shops are made, and are every where in uſe; moreover, very many more might be preſcribed extemporarily, as occaſion ſerves. Of theſe we will here annex a few more ſelect forms, and chiefly thoſe that are taken in the form of Potions, Powders, Electuary and Pills.

A Tincture. *Take of Dwarf-Elder, Engliſh Orris, of each an ounce and half, leaves of Soldanella and Gratiola*, i. e. *Hedge-hyſſop of each one handful, Aſarum, and Aſſe Cucumber-roots of each two ounces, roots of leſſer Galangal ſix drams, choice Jalap half an ounce, Elaterium three drams, Cubebs two drams, ſhred and bruiſe them, and pour upon them three pound of ſmall Spirit of Wine tartarizated, digeſt it ſtopt cloſe in Sand for two days, ſtrain it clear and depurate it by ſettling. The doſe from two ſpoon-fuls to three, in a convenient vehicle.*

Powders. *Take of Elaterium, Soldanella, Ginger, of each one ſcruple, Galangal, Cloves, Cinamon, of each half a ſcruple, Salt of Tartar fifteen grains, make a powder for two doſes.*

Take powder of Jalap one dram, Ginger one ſcruple, Cream of Tartar 15 gr. make a powder to be given in a draught of White-wine.

Pills. *Take of Rhubarb one ſcruple, Elaterium 5 grains, Tartar vitriolated half a ſcruple, Spicknard three grains, with Syrup of Buckthorn make four Pills.*

Take of pill Aloephanginæ half a dram, Elaterium half a ſcruple, Oyl of Cloves gut. 3. make four Pills.

Bontius hydropick Pills are given from half a ſcruple to half a dram, prepared thus:

Take of Aloes two drams and a half, the preparation of Gum-gutta one dram and a half, Diagridium corrected one dram, Gum Ammoniacum diſſolved, one dram and a half, Tartar vitriolated half a dram, make a maſs, and form it into Pills.

Electuaries. Certain hydragogue Electuaries are now every where in uſe and celebrated by practiſers. Of which ſort are, 1. One deſcribed by the renowned *Sylvius*, and the other by *Zwelfer*. This following pleaſes us.

Take

Take of Reſine of Jalap two drams, Tartar Vitriolate one dram, Extract of Rhubarb two drams, of Spurge a dram and a half, leſſer Galangal one dram, beat them in a mortar, and laſtly adde of Conſerve of the flowers of Engliſh Orris, four ounces, and with Syrup of Peach-flowers make an Electuary, the doſe from half a dram to a dram and a half, or two drams.

2. Diuretick Hydragogues.

I might here ſet down or deſcribe many other purging Hydragogues, but Catharticks do not always cure an Aſcites, yea often-times exaſperate it, and (if they be long continued) render it incurable; hence it is neceſſary to have recourſe to other Remedyes for the Cure of this diſeaſe. Wherefore, let us next enquire whether Diureticks do here profit or not?

And truly any one may eaſily think that Remedies moving Urine conduce very much for draining waters out of every place or cavity of the body. In truth it is manifeſt by frequent experience, theſe do often cure an Anaſarca before any other Remedy; let us ſee what they may effect for the emptying the Cavity of the Abdomen.

What Profit they bring in an Aſcites.

As to this it firſt appears, that there is no paſſage immediately open from an Aſcitick pool to the Reins, although contiguous; but that whatſoever waters are transferred from hence thither, muſt of neceſſity firſt be drunk up into the maſs of blood, and from thence be poured out of its boſom into the ſink of Urine; and truly it is but a little which the gaping little mouths of the veins about the ſuperficies of the bowels can receive (if perhaps they are open at all) and Diureticks can but effect this one thing, that by pouring forth the blood, and forcing its ſeroſities more plentifully to the Kidnies, they cauſe the waters fluctuating in the belly to be allured to it being ſo emptyed; in the mean time there is no leſs danger, leſt Diureticks being unſeaſonably adminiſtred, while they diſſolve the blood too much, they conſtrain the ſerum to depart into the ſeat of the Aſcites, more than into the Reins, and ſo rather augment than remove the inundation of the belly. For that it ſometimes ſo happens, I have often found by experience; wherefore when Diureticks are preſcribed to cure an Aſcites, we muſt chiefly provide againſt ſuch a contrary effect. For this reaſon indeed Aſtringents and Corroboratives are always mixt in Remedies for the Dropſie (founded on experience, and the Authority and Practice of the Ancients) not that ſuch (as is commonly ſaid) do confirm the Tone of the Liver, but conſerve the temperature, and mixture of the blood, leſt it be wholly diſſolved by too great a fuſion. Wherefore in an Aſcites which chiefly or in part happens by reaſon of the frame of the bowels and veſſels, and chiefly the Coats, Glandules, and their little ſtrings, and their interſpaces being ſtuffed by a ſerous humour, and therefore very much ſwell'd up, as Catharticks ſo alſo Diureticks profit, and are frequently taken with ſucceſs; foraſmuch as by the uſe of theſe the maſſe of blood being emptyed (the ſerum being more plentifully derived to the kidneys) doth eaſily receive unto it ſelf thoſe waters every where ſtagnating about their little mouths, and conveys it towards the urinary ſink: but on the contrary, in a meer Aſcites where the heap of waters do overflow the Cavity of the Belly, the Textures of the bowels being free from the ſerous ſtuffing; Diureticks are given in vain, or incommodiouſly; inaſmuch as they expreſs nothing from this Lake of the belly, and moſt frequently by diſſolving the blood more impetuouſly drive together the waters apt to be inſtill'd there.

With what choice and difference they ought to be adminiſtred.

Not all Diureticks of every kinde are equally convenient in an Aſcites, neither ought they indifferently to be adminiſtred; for we muſt obſerve, the affected in this diſeaſe for the moſt part make a little, reddiſh Urine, and as it were lixivial; which truly is an indication that the temperature of the blood is too much bound in them, by reaſon of the fixt and ſulphureous Salt exalted and combined together: and therefore that the Serum is not duely ſeparated within the reins; which notwithſtanding is ſhook off about the windings of the obſtructed bowels, and ſo is depoſited in the Cavity of the Belly. Wherefore in this Caſe it will be convenient to drink only thoſe things to excite Urine, which ſo reſtore and amend the Conſtitution of the blood, that the enormities of the fixed Salt and Sulphur being taken away, the ſerous part might be ſeparated within the reins, and more plentifully diſcharged; for which purpoſe, not acid or lixivial things, but thoſe endowed with a volatile Salt are appointed. For I have often obſerved in Patients of that kind, when the Spirit

of

of Salt, and other acid drops of Minerals, and when the diſſolutions and Deliquiums of Salt of Tartar, Broom and other things, have done more hurt than good, that the Juice of Plantane, Brooklime, and other Herbs abounding with a volatile Salt, have much helped, as alſo the expreſſions of Millepedes: for the ſame reaſon Salt of Nitre throughly purified or Cryſtal Mineral doth often profit. Forms of Medicines more accommodate for this uſe are extant in our former Treatiſe, where, *viz.* examples of Diureticks are deſcribed, in which both volatile and nitrous Salts are the Baſis. Moreover, hither ought to be referred the notable experiment, by which *Joannes Anglus* affirms himſelf often to have cured the Aſcites from a hot cauſe, which Medicine alſo that expert Phyſitian Dr. *Theodore Mayern* was wont to magnifie and preſcribe in the like caſe.

John Engliſh *his Empyrical remedy.*

Take of the juice of Plantane and Liverwort, and fill an Earthen pot to the top, which being ſtopt cloſe, put in a hot Oven after the Bread is drawn, and make a little fire on the ſides of the pot to continue the heat of the Oven; after it is ſo boyl'd ſtrain it, and being ſweetened with Sugar, drink of it Morning and Evening, and it cures. In imitation of this I have often with ſucceſs preſcribed as followeth.

Take of green Plantane-leaves four handfuls, Liverwort, Brooklime, of each two handfuls, bruiſe them together, and pour upon them half a pound of ſmall compound Radiſh-water, or other appropriate Magiſtral, expreſs it ſtrongly, the doſe three ounces three times in a day.

How beneficial Diaphoreticks are in an Aſcites.

Although Diaphoreticks are moſt efficacious in an Anaſarca, yet in an Aſcites they are rarely or not at all uſed: for being unſeaſonably offered, they impreſs oft-times great hurt on the Patient without any avail; foraſmuch indeed as by heating the blood, they cauſe the fluctuating waters to grow hot, and as it were to boyl in the hollowneſs of the belly; ſo that the ſpirits and humours are diſturbed by vapours raiſed from thence; and ſo a diſorder of all the functions follows, and the very bowels being as it were boyled, are much prejudiced. Moreover from ſweating unadviſedly inſtituted, the blood being forced into a fuſion and precipitation of the Serum, throws it off the more into the neſt of the Aſcites. Wherefore when ſome preſcribe fomentations, and liniments, and bathing, to be applyed to the ſwelling Paunch of the Belly, for the moſt part it turns to the worſe in ſuch Patients; for beſides a little Feaver, a Vertigoe, fainting of the ſpirits, and other ill ſymptomes of the brain and heart, being moſt frequently ſo raiſed, even the belly alſo doth from thence ſwell the more: foraſmuch as the Blood being agitated and poured out, depoſits in that place more largely the Serum; and for that cauſe the mouths of the Veſſels are more looſened and opened, ſo that they may more readily let fall water prone to depart from the maſs of blood. But the Remedies which are chiefly wont to be adminiſtred with ſucceſs near the places affected (when a Cure is intended without a Paracenteſis) are Clyſters and Plaiſters.

Glyſters and Plaiſters.

The former draw the Serum out of the Veſſels and Glandules of the Guts and Meſentery without fuſion of the whole maſs of blood, (which the ſtronger purging Medicines do excite,) which being ſo emptyed do imbibe a little the extravaſated Lympha. For this purpoſe the enſuing Clyſter, wont to be preſcribed by us in this caſe, is moſt fit, in regard it contracts the inteſtinal fibres together, and draws the Serum imbibed by the blood, or contained formerly therein, towards the Reins.

Forms thereof.

Take a pint of Urine of a ſound man that drinks Wine, Venice *Turpentine diſſolved with the Yolk of an Egge, an ounce and a half, Sal Prunella one dram and a half, make a Clyſter, which repeat daily.* Sometimes Plaiſters yield help in an Aſcites, yet let them be ſuch, as by a certain reſtringent and comfortable virtue ſtrengthen the bowels and bind together the mouths of the Veſſels, leſt they too much ſpue out their ſeroſities: for this purpoſe, I uſe to apply the Plaiſter *Diaſaponis* with ſucceſſe. Or,

Take of the Plaiſter of Minium, Paracelſus *Plaiſter, of each what ſuffices, make a Plaiſter to be applyed to the Abdomen.* If this diſeaſe is accompanyed with a Tympanie, Epithemes of another manner are fit, as we ſhall hereafter declare.

The great and moſt preſent remedy of an Aſcites, is, that the waters may be drawn out by a Paracenteſis being made; which adminiſtration however doth not oftner cure the diſeaſe, than kill the Patient; wherefore there is need of exact caution

to whom, and at what time of the diſeaſe it ought to be adminiſtred: to perſons of an ill habit, who have been long ill, in whom the conformation and temper of the bowels is wholly depraved, it will be in vain to have the Lympha drawn out by the Paunch being pierced; for thereupon immediately the Spirits faint and the ſtrength is diſſolved, and after a while a new illuvies of the morbific humour ſucceeds. But thoſe who being formerly of ſound bowels, and healthful enough, as to other parts, when they fell into an Aſcites from ſome great and evident cauſe, as we are not at firſt preſently to make a Paracenteſis, ſo neither if it be needfull ought we to deferre it too long: for an incorrigible depravity of the Bowels is contracted by a longer delay, while they remain a long while drowned, and as it were boyled in water.

When and to whom a Paracenteſis is convenient in an Aſcites.

It is beſide our purpoſe to deſcribe here the adminiſtration of a Paracenteſis, whether it be done after the ordinary manner, or by a hollow Needle according to *Sylvius*; this part of Chirurgery, as dangerous, when Phyſitians ſeldom preſcribe, yet Quacks and Empiricks raſhly and unluckily eſſay it, Artiſts not being conſulted: we will relate here for concluſion the Hiſtory of a true and huge Aſcites, lately cured without any Paracenteſis.

A young Woman wife to a Merchant, being ſlender and proper, while ſhe gave ſuck to her Child, to encreaſe her milk day and night did immoderately guzzle one while plain Ale, another while Poſſet-drink. After having uſed this kind of dyet for a fortnight, ſhe contracted a vaſt Aſcites in a ſhort time, the beginning whereof ſhe was not in the leaſt ſenſible of; for her Abdomen being great with water fluctuating within, did much ſwell up, and its bulk when ſhe turned from one ſide to the other, fell without the Ileon and borders of the reſt of the body: when in the mean while the fleſh of all her Members was very much conſumed, that ſhe ſeemed no leſs in a conſumption than a Dropſie.

A hiſtory of a cure.

The Child being weaned, and a better courſe of Diet being appointed, ſhe betook her ſelf to Medicines, and took in the firſt place the more mild Hydragogues, as well purgative as diuretical, but without any advantage; alſo ſhe was worſe after every purge; but being committed to our care, and almoſt deſperate, I handled her after the enſuing method.

I preſcribed theſe Medicines, for the moſt part forbidding Ale, and any potulent liquor (medicines excepted.)

Take of the leaves of Plantane, Brooklime, Clivers, of each 4 handfuls bruiſed, and pour upon them of water of Earth-worms and Rhadiſh compound of each three ounces, preſs them, take it twice a day, viz. *at Eight in the Morning, and at Five in the Afternoon. She continued long in the uſe of this Medicine, but did ſometimes vary the Compoſition, ſometimes changing the herbs, ſometimes the Liquor poured on them.*

Take of the reddeſt Tincture of Salt of Tartar an ounce and a half, ſhe took 20 drops at night, and early in the morning, in two ſpoonfuls of the following Julep, drinking ſeven ſpoonfuls after it.

Take water of Elder-flowers, Saxifrage, of each ſix ounces, water of Snails, Earth-worms, and Rhadiſh-compound, of each two ounces.

She wore a Plaiſter of Minium and Oxycroceum upon her Belly.
The following Clyſter was given firſt daily, afterwards every two or three days.

Take Urine of a healthy man one pound, Turpentine diſſolved with the Yolk of an Egg an ounce and a half, Sugar an ounce, Sal Prunella one dram, make a Clyſter.

By the conſtant uſe of theſe things her Belly aſſwaged within a fortnight, but her fleſh daily waſting, a Conſumption was threatned. Wherefore, going into the Countrey to avoid this, ſhe drank Aſſes milk; by the benefit of which Nutriment and of purer Air, continually taking the above-mentioned Medicines, ſhe recovered her entire health within three or four weeks, and lives yet in health.

SECT. II. CHAP. IV.

Of a Tympanie.

A Tympany not properly a kind of Dropſie.

A Tympany vulgarly, although not properly, is eſteemed a kind of Dropſie, from which rank, *Proſper Martianus* alleadging the teſtimony of *Hippocrates*, rejects as well this Diſeaſe, as an Anaſarca. But the former infeſting the region of the Abdomen, and raiſing it up into a bulk, now comes under conſideration next after an Aſcites, (to which it is ſomething a-kin): where firſt of all it is obvious, that this Diſeaſe as it is moſt difficult to cure, ſo alſo to be known; for although its outward form, *viz.* a ſomewhat hard ſwelling of the belly, very ſtiffe and yielding a ſound like a Drum, upon touching it, is evidently perceived by many ſenſes together; notwithſtanding what may be the morbifick matter inducing that Tumour, or after what manner it is generated in the belly, or from what place it comes thither, is altogether unknown: therefore thoſe who have a Tympanie, as though they were big with winde, are ignorant both of the manner and time of its conception. Truly I therefore judge the nature and cauſes of this diſeaſe to lye concealed, becauſe whereas its firſt beginnings are not obſerved, it ſuddenly augments prodigiouſly; ſo that they who are affected, do ſcarce ſooner perceive themſelves to be ſick, than that they are become almoſt incurable. Moreover, a Tympanie, its ſtation being accompliſhed, degenerating into an Aſcites, or rather procuring it to its ſelf, ſeems to loſe its own nature; and truly after death Anatomical inſpection ſcarce diſcovers any thing more in bodies dying with a Tympany, than with an Aſcites. But that many Phyſical Authors do readily declare this Diſtemper to be raiſed by wind encloſed within the cavity of the abdomen, doth not at all ſatisfie a mind deſirous of the truth; becauſe it ſeems altogether improbable that winds ſhould be produced ſo ſuddenly, and in ſo great plenty in that place; or admit they were, that ſo hard, unmovable and conſtant a tumour ſhould be raiſed.

Wherefore its cauſe is occult.

Commonly aſcribed to Winde.

Authors do not agree about the ſeat of the Windes.

Moreover they do not eaſily agree concerning the ſeat of the diſeaſe, where the wind is ſuppoſed to be included; for ſome affirm that this place is determinate in the concave of the Peritonæum, and by the convex ſuperficies of the Inteſtines, and other bowels of the lower part of the belly; but after what manner ſuch a heap of winds can be therein collected, in my opinion it cannot be manifeſted by any reaſon, example, or parallel inſtance. Beſides, if the caſe were ſuch, it might be more eaſily cured by pricking, than an Aſcites by a Paracenteſis; which yet I never heard accompliſhed. *Helmont* reports a ſtinking wind was vented by a Paracenteſis, in one eſteemed Hydropick; that ſuddenly his abdomen ſunk, and the man dyed immediately. But *Platerius* and *Smetius*, no leſs worthy of credit, do affirm, *They diſcovered in ſome who were thought to have the Tympanie, and diſſected after death, that no wind broke forth out of the hollow of the belly, neither that it fell, but that eſpecially the ſmaller guts being diſtended, and ſtrutting with winde, burſt out ſo, that they could not be put up again into the ſame belly.*

Not without the guts in the cavity of the Abdomen.

Nor within their paſſages.

But truly neither is this obſervation an argument to me, that the cauſe of the diſeaſe (of which we treat) remains within the Cavities of the guts, and that the winds accumulated in that place, do often or moſt of all raiſe a Tympanitick ſwelling of the belly. For beſides that, a diſeaſe taking riſe from ſuch an occaſion, would not be ſo immovable, and frequently incurable; moreover, I am induced to think, that the Inteſtines are not ſo greatly dilated by winds ſhut up in them, but that they often of their own accord ſwelling out, give occaſion to thoſe winds conſequently and ſecondarily to be produced, by which the ſpaces enlarged might be filled, as we ſhall by and by more clearly demonſtrate.

Not between the coats of the bowels.

But what is aſſerted by others, that the windes which are the cauſe of a Tympany, are engendered among the Coats of the Meſentery, and Guts, ſeems yet much more improbable; becauſe when there is no cavity in that place preexiſtent, after what manner can the winds ſo tear thoſe parts and ſeparate them from one and another, ſo that from ſuch formed Denns, the whole region of the Belly ſhould grow into ſo vaſt a bulk by accumulated windes there laid up? Certainly ſo many and ſo great divulſions could not be made without continual torment and moſt ſharp pains.

Where-

Wherefore, omitting theſe opinions already ſpoken of about a Tympanie, let us proceed another way to the more aſſured ſearching out its Pathologie; *viz.* by thorowly weighing by what means, and by what evident cauſes, the Abdomen is wont to ſwell up. Wherefore, we advertiſe there are four kinds of things contained, from which proceeds a tumour in the nether Belly of the living, (why the Abdomen ſwells in dead perſons, the reaſons follow hereafter) which kinds are, ſolid, humid, wind and Spirits.

By what and how many cauſes the Belly ſwells.

Firſt, It is obvious enough, that the inward tumours of the bowels, *viz.* ſcirrhous, ſtrumous, cancrous and glandulous, and ſome perhaps of another kinde, when they riſe to any notable bulk, do ſwell the whole belly; yet in the mean time as long as they are ſimple, and new, they may be perceived and circumſcribed by the touch; yet afterwards growing inveterate, they cauſe other evils to the neighbouring parts, yea over the whole Region of the Abdomen. Truly theſe as they are ſometimes the procuring cauſe of an Aſcites, ſo of a Tympany from the beginning, to which afterwards for a complement of either diſeaſe, another conjunct cauſe gains acceſs, *viz.* an illuvies of waters, or an irregularity of the Spirits.

1. *From tumours of the Bowels in that place.*

Secondly, a watery humour gathered within the Cavity of the abdomen, or being impacted in the membranous or glandulous parts thereof, frequently produces an Aſcites, the reaſons whereof, and the manner of its coming to paſs, are at large ſet down before.

2. *From waters gathered as in an Aſcites.*

Thirdly, Winds within the bowels of Concoction being raiſed from crudities, ill concoction, or fermentation of heterogeneous humours, do frequently puff up the Cavity of the guts, and for the moſt part produce a ſhort and tranſitory tumour of the belly. For the fermentation of the Juices ceaſing, and eruption of wind being procured, immediately ſucceeds an aſſwaging of the Belly. To this cauſe, both the Colick and Tympanie, not only by the vulgar but by Phyſicians of great note are imputed; but in our judgement, when it is ſolitary it produces neither of theſe diſtempers.

3. *From winds.*

Fourthly, There yet remains another ſudden, and vaſt ſwelling of the belly, which the animal Spirits, (not for nothing ſtyl'd by *Hippocrates* violent) ſeem to procure. For when theſe in heaps, and inordinately, ruſh into the nervous fibres belonging to the bowels of the lower belly, preſently the parts that theſe weave together are cauſed to be puffed up, and extended every where round about. For truly, from this cauſe (as we have often ſhewed in another place) a ſwelling, and as it were a tympanitical puffing up of the whole abdomen, as well in the Colick as in Hyſterical fits vulgarly ſo called, doth often happen. And truly theſe diſtempers are ſo allyed to a Tympany, that they frequently end in it; for I have oft obſerved, that thoſe who have been obnoxious to the Colick and hyſterical paſſion long and grievouſly, unleſs they receive cure, do become Tympanitical. And then the greateſt of the difference will be, that the ſwelling of the belly, which before was a wandring Symptom, and ſoon paſſing over, at length grows to be a fixt and permanent diſeaſe.

4. *From the inflation of the Fibres, by reaſon of the Spirits being diſturbed.*

Wherefore, it ſeems material in this Caſe, to accommodate the Ætiologie of thoſe paſſions delivered by us in another place, to unfold the Nature and Cauſes of this preſent maladie.

Which truly will not be of any great buſineſs or difficulty. For ſuppoſing (what we have in another place more largely ſet down) the extenſions and inflations of the membranes and hollow bowels, take their origine from the impetuous invaſions of the Spirits into the nervous fibres (of which they are interwoven) it will be obvious enough to conceive even a Tympanie to be produced from ſuch a cauſe, but being more fixt, and longer, or unceſſantly in the act; into the reaſon of which difference, we will by and by inquire.

An Affection of what ſort a Tympany is.

In the mean time I am induced to believe a Tympanie not to be ſtirred up from winds ſhut up within, or without the Cavity of the guts, (for ſuch an accumulation of winds in thoſe places, is an effect, but not a cauſe of this diſeaſe) but that it does ariſe, inaſmuch as the animal Spirits, in the bottom of the belly, belonging to the membranous bowels, being forced into diſorder by ſomething incongruous, do tumultuouſly ruſh every where into the nervous fibres, and puffe them up, neither do they immediately recede back from them: from hence the Peritonæum ſwells, and the guts being blown up and enlarged, they are as it were inflated, the Meſentery, and other membranous bowels, being turgid with an impetuous Spirit, are as it were raiſed up into a bulk; moreover, while theſe come thus to paſs, that the vacuities cauſed from the ſwelling of hollow bowels might be filled, a portion preſently

Its cauſe and formal reaſon explicated.

of every humour within contained, being rarified into vapours, forthwith turns into wind, wandring about thoſe empty ſpaces.

And proved by arguments and inſtances.

Truly, we have clearly enough ſhewn, by reaſons and inſtances in our Pathologie of Convulſions, that the animal ſpirits puff up the membranous parts by their irregularity, and ſo produce as it were this windie Diſtemper. Moreover the ſame is demonſtrated by Anatomical obſervation made in diſſecting a living Creature; *viz.* inaſmuch as the Trunk of the eighth pair of Nerves, deſcending on each ſide by the Neck, if it be taken out and bound with a thred, forthwith all the ſtomach ſwells up, as if it were puffed with winde; which certainly can proceed from no other cauſe than that the animal Spirits of the fibres of that bowel, and others flowing through the nervous paſſages, (inaſmuch as they being cut off from their origine, are driven into confuſion) do tumultuouſly enter thoſe parts, and puff them up. Beſides theſe, for the further illuſtrating of this Hypotheſis, I will relate a Hiſtory cited by the moſt renowned *Smetius*, of an univerſal Tympany (as he calls it) in a certain young man of *Liege: Who when he had received, in a conflict, under his right arm-pit, a wound, made by a prick, penetrating into the Cavity of his breaſt, next day and night being paſt, he appeared in the morning after ſwell'd throughout his whole body, not only in his breaſt, but alſo in his back, belly, loins, and in the cods, beſides both in his arms, ſhoulders, neck and face, that he could not open his eye-lids, alſo on the crown of his head, the skin being every where ſwolne and tumefied, the tumour was every where extended with great pain.* The Author calls this wonderful affection, an Univerſal Tympanie. The moſt renowned *Sennertus* relates a Caſe like this from his own knowledge: Moreover, I remember I have heard or read of the like from a wound of the breaſt being received near the arm-pit.

An univerſal Tympanie.

The Cauſe of an univerſal Tympanie enquired into.

Notwithſtanding, the reaſon of this Symptom, deliver'd by *Smetius*, and approved by *Sennertus*, doth not at all pleaſe me: for they aſcribe the cauſe of that general Tympanie *to the puffing up of the breaſt, by the axillary wound, made all that night under the skin, as we ſee a new and moiſt bladder to be blown up by boyes with a quill:* which truly doth not only ſeem improbable, but alſo we think ſcarce poſſible, that the wind to be blown out of a wound of the Thorax, by reaſon of the hole one night ſtopt, can enter the skin, and from thence paſſing through the whole body, ſhould make it become every where Tympanitical: For beſides that the wind cannot ſo ſuddenly paſs from thence into all parts, although it ſhould be blown with a quill from the mouth, under the skin; beſides, while the orifice of the wound is ſtopt, no wind can altogether be blown out from the Cavity of the breaſt, becauſe none in the mean time enters. But aſſuredly the cauſe of that wonderful affection is this; (whence alſo the formal reaſon of a Tympanie is illuſtrated) In the Breaſt near the Arm-pits, are many and eminent foldings of Nerves, (as we have deſcribed in our Treatiſe of Nerves,) by which the nerves of the whole body communicate among themſelves: *viz.* the Trunk of the eighth pair unites with the intercoſtal Nerve, and both with the nerves of the *Spina Dorſi*, by branches and ſprigs ſent here and there. Wherefore, this nervous folding, perchance being pierced by the point of the Sword, firſt of all the ſpirits reſiding in that place being provok'd, run into diſorders, afterwards a conſent being immediately made thorow ſo many notable Nerves, and tranſmitted to and fro every where, other Spirits, and then again others, are ſenſible of the like irregularities, and puffing up the membranous and nervous Fibres (which every where they enter tumultuouſly) they induce as it were a tympanitical affection through the whole body. By reaſon of the like fury or virulent madneſs impoſed upon the Spirits, in any place, and from thence immediately diffuſed far and wide, certain Poyſons being drunk, the ſtrokes of weapons, or of wild Beaſts, or a venemous bite, do frequently induce a ſwelling together of many parts, or of the whole body; which ſwelling diſtemper of the Spirits, is ſtyl'd by *Helmont* to be *Indignatio Archæas*. There are many other Caſes and Inſtances, by which it is moſt clearly evinced, that the Animal Spirits being provok'd, and driven into angry inclinations, inaſmuch as they do more impetuouſly enter into the nervous Fibres, are wont firſt to ſwell the membranous parts, and to excite many paſſions out of thoſe, which are vulgarly but falſely aſcribed to windes: ſo that in truth no other cauſe of a Tympanie can be aſſigned more like truth.

The true cauſe aſſigned.

Why the belly ſwells in the dead.

If it be objected, that the Paunches of the defunct after ſome time are raiſed by winde into a bulk, and ſwell like as in a Tympany: I pronounce this to proceed from the putrefaction of humours, and the extream diſſolution of the mixture, wherein all

all the active particles depart, being freed one from the other, and flying about ſeek vent in every place, and diſtend greatly all obſtacles, and chiefly the ſides of the Cavities, (which doth not at all happen in living bodies;) wherefore, as all Carkaſes do not putrifie alike, ſo their bellies ſwell ſooner or later, more or leſs: But while life endures, no rottenneſs or diſſolution of particles is made in an animated body, that can bring about a ſplanchnick fermentation or ſwelling. In the mean while we deny not, that winds are generated within the offices of concoction, ſanguification, and ſeparation, yea within all the particular cells and receſſes of our whole body; notwithſtanding from them all, unto the winds whereſoever engendred (whileſt the Spirits have their due influence, and actuate the nervous as well as moving fibres, that the ſides of the bowels be not kept diſtended and rigid) an eaſie vent does every where lye open. And the truth is, in a Tympany, we allow the wind to fill up the empty ſpaces, but the ſpirits, inaſmuch as they extend the bowels by their irregularity, do firſt cauſe thoſe vacuities, (wherein the winds ſecondarily and conſequently are engendred) and they (inaſmuch as the ſame bowels are ſtill kept ſtrutted and diſtended) do hinder thoſe winds from being removed.

The Animal Spirits and not winde the cauſe of the Tympanie.

And now I judge it is plain enough by what we have ſaid, that the animal ſpirits rather than the wind do raiſe ſwellings of the belly in that ſort; at leaſt ſuch ſhort and tranſitory ones, as happen in Hyſterical and Colick fits. Notwithſtanding there yet remains a great difficulty, after what manner the Tympanitical ſwelling of the Abdomen, which is fixt and permanent, yea for the moſt part immovable, can proceed from any ſuch cauſe; eſpecially, becauſe the Animal Spirits being of their own nature active and very apt to motion, do for the moſt part ſo affect removal, that unleſs they be wearyed or become defunct, they ſcarce ever lie ſtill.

That I may looſen this knot by reaſoning, it becomes us to conſider the Nervous Juice together with the ſubſtance of the Animal Spirits, which is every where a vehicle to them, and alſo a bridle: for the Spirits enjoying the moſt ſubtile ſtream thereof, do freely expatiate, and leſt being diſſipated from one another, they might fly away, they are contained in an entire ſeries. When therefore that Juice is faulty as to its temper or motion, immediately the animal ſpirits become diverſly delinquent, or are perverted in the exerciſes of their functions, as we have at large expounded in our Treatiſe of Paſſions. And leſt by repeating them now I ſhould make long Preambles, I will contract into a few words what belongs to the preſent purpoſe.

This happens by the fault of the Nervous juice.

Wherefore in the firſt place, it is to be obſerved, that the contents of the nether belly (excepting only the Liver, Spleen, and Kidneys) are furniſhed with many membranous bowels, (which the nervous fibres for the moſt part weave together) whence it follows that the nervous Juice (whoſe journey is longer, and the paſſages ſtraiter in theſe parts) doth find here many remora's: which alſo may be proved from the effect, foraſmuch as the convulſive invaſions, every where ſtirr'd up in the Hypochondriack, Colick, Nephritical and Hyſterical Paſſions, do ſo grievouſly infeſt the Abdomen. When therefore that Juice watering the nervous fibres of theſe parts, ſhall be either viſcid or tenacious of it ſelf, or fill them with very many feculencies, for that cauſe it will come to paſs, that all the animal ſpirits will not eaſily return from thence as oft as they are hurl'd into theſe fibres, in ſome part obſtructed: and when in this manner there is a full incurſion, and a ſmall return of them, at length it will happen that great abundance of the ſpirits remain in theſe fibres every day more and more impacted, and hold them always diſtended and very much pufft up; and at length by reaſon of the ways of their ingreſs and regreſs in thoſe fibres being obſtructed, they become immovable in that place, and keep the affected parts always extended and ſtiffe: in the mean time becauſe theſe Spirits there impacted within the nervous paſſages, and cramm'd thick, have commerce with others that flow to them in their dens, therefore the affected part although it be ſtiffe and almoſt immovable, yet however enjoys ſenſe. This Pathologie although it may ſeem to ſome a Paradox, and uncouth, I doubt not but it will deſerve aſſent from many, if it be throughly weighed, that thoſe who have been a long time obnoxious to Hypochondriack, Colick, and other convulſive diſtempers of the nether Belly, do at length become ſick of a Tympany.

By the obſtruction whereof the Spirits within the fibres are detained and made immovable.

The formal reaſon and conjunct cauſe of a Tympanie being delineated after this manner, before we proceed to trace out diligently the more remote cauſes thereof, it may be lawfull for us from what we have ſaid to deliver a definition, or at leaſt a certain

A deſcription of the diſeaſe.

certain deſcription of this diſeaſe, viz. *That it is a fixt and conſtant Tumour of the Abdomen, equal, hard, ſtiff, and yielding a noiſe upon ſtriking, taking its origine from a convulſive inflation of the parts and membranous bowels, by reaſon of the Animal Spirits being driven into thoſe fibres in too great abundance, and through the fault of the nervous juice obſtructing, being hindred from their return back; to which diſeaſe conſequently an accumulation of winds in the empty places, accrues as a complement.*

Its procuring cauſes.

As to what appertains to the procuring and evident cauſes of this diſeaſe, it very ſeldom happeneth that they are altogether obſerved, but that inſinuating it ſelf by ſilent beginnings, it frequently is finiſhed, or becomes deplorable before it is perceived; inſomuch that againſt this diſeaſe ſcarce any antidote can be appointed; for while the ordinary functions are not much prejudiced, the ſwelling of the belly is preſumed only to have its origine from winde, and while it is expected to vaniſh ſpontaneouſly, it often grows into a Tympanie. Wherefore that we may have timely notice of its beginning, we may take notice, that ſome previous affects diſpoſe to it; of this ſort is firſt an Hypochondriack, Colical and Hyſterical diſpoſition, yea and ſometimes an Aſthmatical; whoſe fits when they are uſed to be frequently raiſed, if at length a tumour of the Abdomen follow it, though it be ſmall in the beginning, a Tympany forthwith may be feared. Of the former of theſe affects caſes every where are to be met with, and ſtand fair to common obſervation: of the later *Scherichius* reports, *That a man of Sixty years of age was infeſted with this ſymptome ſome months before his Belly was ſwell'd into any manifeſt tumour, that as often as he ſate at meat, beginning to eat, alſo when compoſing himſelf for ſleep, he began to ſleep ſoundly, he was ſurprized with ſuch a difficulty of breathing, that the frequency of it threatned the danger of choaking; at which time alſo he perceived a certain palpitation about the Hypochondria, as if ſome living Animal were underneath the midriff; this diſtemper afterwards ended in a Tumour of the Abdomen, by which he dyed.* In this and other caſes now cited the ſame reaſon holds, *viz.* that the animal ſpirits being uſed to make irregular excurſions into the nervous Fibres of the lower belly, at length do not only more often and abundantly enter into them, but being impacted and hindered they abide in them, and ſo at length induce tympanitic inflations of the bowels. Truly this morbific beginning happens ſooner or later, if thereupon do come the evident cauſes, which diſturb the Spirits in the bottom of the belly, and compel them to frequent diſorders, and alſo do either ſtop the motion or pervert the temperature of the nervous Juice flowing within thoſe Fibres; in which rank are accounted irregularities in the ſix Non-naturals, immoderate Paſſions, and chiefly of grief, and uſual evacuations ſuppreſs'd, drinking of cold water after ſome great heat, or any ſudden cold induced on the belly, either from air or water.

Other previous convulſive affections.

The caſe of an Aſthma ending in a Tympanie.

The evident cauſes of this diſeaſe.

The Prognoſticks thereof.

As to the Prognoſticks, this diſeaſe is always accounted of ſo bad an omen that commonly the name is abhorr'd, inſomuch that frequently when there is no ſuſpicion of ill from the tumour of the belly, if perhaps that ſwelling be call'd by the Phyſitian, a Tympanie, forthwith it is concluded deſperate. Notwithſtanding this Diſeaſe rarely kills of it ſelf, but being protracted a long ſpace of time, that it may at length more certainly kill, it gains to it ſelf an Aſcites, as a Harbinger of Death. That we may ſearch into the reaſon thereof, it will be obvious enough to conceive, while all the bowels are diſtended in the lower belly, and are held as it were ſtiffe, the paſſages of the blood, and nervous and lymphatic humours, being too much extended, or compreſſed are much ſtraitened, and for that cauſe cannot freely and readily tranſmit its Juice; from whence it follows that every humour being ſtraitned in the paſſage, that at length it may paſs by ſome means, it ſhakes off a certain ſeroſity from its maſſe wherever way is given; and thoſe droppings of the humours falling into the hollow of the Abdomen, excite an Aſcitick Dropſie.

The Cure.

What relates to the Curatory part of this Diſeaſe, the whole ſcope of healing is commonly bent againſt wind, *viz.* Indications inculcated by practical Authors ſuggeſt the matter to be evacuated, from whence the winds are raiſed, and to remove the cauſe that lifts them up, and the winds to be diſcuſs'd and diſſipated, which do already diſtend the belly.

For theſe ends Purgers appointed againſt the humour chiefly ſuſpected are wont to be preſcribed with great confidence, although with ſmall or ill ſucceſs; that is to ſay, Phlegmagogues ſo called, another while thoſe that purge Melancholy, another while thoſe that purge Choler, whereto alſo are joyn'd purgers of water (as weapons intended againſt every enemy.) For this diſeaſe (as is manifeſt by our obſervation) is

wont

wont for the moſt part to be exaſperated with ſtrong Purgers, and ſeldom alleviated; the reaſon whereof is evident enough, becauſe the nervous fibres being provok't by a ſharp Medicine, the animal Spirits renew their irregular excurſions, and do every where more and more ſtretch them out, rather than give any remiſſion to them; wherefore, although frequent and abundant watery and flatulent ſtools are procured, notwithſtanding the Belly ſwells the more. Moreover, to diſpell, diſcuſſe, and bridle the winde, there is a more than Æolian power preſcribed; Medicines commonly call'd *Carminatives*, almoſt of every kind or form are ſedulouſly adminiſtred, within and without, above and beneath, and upon the part affected; notwithſtanding this diſeaſe for the moſt part is untamed by all theſe; whence we may ſuſpect, that the true cauſe of the diſeaſe lyes as yet conceal'd, becauſe Medicines profit not that are adminiſtred, indicated or ſuggeſted according to the ordinary Ætiologie or reaſon of it.

Remedies deſigned againſt Wind profit not.

Although I cannot challenge a better ſucceſſe in curing this diſeaſe, or a more certain method of healing, atteſted from experience, notwithſtanding in the mean while we will here proffer another way of curing, accommodated to our Hypotheſis, and eſtabliſhed by reaſons ſtrong enough.

Wherefore in a Tympany, as in moſt other affections, there will be three chief indications: Whereof the firſt, and chiefly inſiſted on, is the Curatory, that by recalling the animal Spirits from their convulſive affection, and reducing them into order, endeavours the removal of the ſwelling of the Belly. The ſecond Preſervatory, which reſtrains thoſe or other Spirits from their irregular excurſions into the lower Belly, and together corrects the faults of the nervous liquor, watering it, both as to its temper, or motion. The third Vital, by removing the Symptoms urging, doth ſuccour and ſuſtain all the functions oppreſſed or weakened, as much as poſſible may be.

3. Curatory Indications.

I. The firſt Indication is of greateſt moment, on which the hinge of the whole Cure turns, but it is moſt difficultly performed, for it doth not eaſily appear by what remedies or wayes of adminiſtration it ought to be attempted, when moſt weapons or medicines do little or nothing prevail againſt this inviolable enemy. Phlebotomie aſſumes no place here, but is declined for the moſt part as prejudicial; alſo Catharticks, inſomuch as they provoke the affected fibres, and diſturb the Spirits, and hurry them more impetuouſly, do increaſe rather than diminiſh or cure the Tumour of the Belly; in like manner Diaphoreticks impell the Spirits and the morbific particles deeper into them, whereas they ought to be allured, and call'd out of the Fibres. The chief order of healing ſeems to be placed in Diureticks and the uſe of Clyſters; and alſo great things are expected from topical Applications, becauſe they are more immediately exhibited to the diſeaſe, and as it were by contact, and becauſe they do beſt diſcuſſe Tumours in other places. Yet not all Diſſolvents are here fitting, nor thoſe which profit moſt in other Tumours; for the more hot being given for diſcuſſing, whether they are applyed by fomentation, Liniments, or in the form of a Cataplaſm or Plaiſter, oftner afford hurt than ſuccour in a Tympanie; for they both open and dilate the paſſages of the fibres, that from thence they may lye more open to the incurſion of the Spirits; and alſo rarifie the particles impacted, ſo that while they occupy a larger ſpace, an inflation and intumeſcency of the Belly is augmented. Laſtly, what appertains to Alteratives which ſuccour againſt other affections of the nervous kinde, only a certain few are fit in a Tympanie; for where the morbific matter ſticking within the ſtraiter paſſages cannot be impell'd ſtraight, or throughly, Elaſtick medicines render the ſtoppage greater and more fixt, by enfixing the matter deeper; wherefore Spirit of Harts-horn, of Soot, of Sal Armoniack, yea alſo Tinctures, Elixirs, and other Medicines endowed with a volatile Salt, or active particles of another kind, do not only acquire heat, and a troubleſome thirſt in the ſick perſon troubled with a Tympanie, but alſo cauſe the Abdomen to ſwell the more, inaſmuch as they melt the blood and nervous Juice, and ſtirre the Spirits, inſomuch that the particles depoſited by each of theſe, are compell'd into the parts affected.

The firſt Indication hardeſt.

What, and what ſort of Medicines are good or hurtful in this Diſeaſe.

But truly although Medicine doth ſo little avail againſt this diſeaſe, it is not altogether to be neglected, (as if either it effected nothing, or what is ill,) but it behooves us to turn every ſtone, that by ſome means we may ſuccour the Patient, and at length may obtain a cure for him, or at leaſt an alleviation. Wherefore in the firſt place (becauſe it is the cuſtom to begin with Purgatives) although the ſtronger do ever hurt, and the gentler ſcarce ever prevail to diſcharge the conjunct cauſe, notwithſtanding theſe latter, inaſmuch as they do ſomething ſubſtract the nouriſhment of the diſeaſe, alſo

Only mild Purgers and Clyſters are convenient.

alſo make a way by which other Medicines do exert their powers, they ought to have their turns in phyſical practice once in ſix or ſeven dayes; and at other times let Clyſters (whoſe uſe is much better) be frequently adminiſtred. Hydroticks being prohibited, we muſt reſt upon moderate Diureticks, whereto are adjoyned things reſpecting the alteration and reduction of the Spirits and Humours, which truly make up the Tympanitical pharmacy. Moreover in the mean time the uſe of Topicks is not to be neglected. We will annex certain ſelect forms of Medicines appropriated for every of theſe purpoſes. For a Medicine mildly ſolutive, let the laxative Wine be uſed, preſcribed by the renowned *Greg. Horſtius* for a Tympanie, in his book of Obſervations, *lib.* iiij. *Chap.* xxx. or in its place let the following be preſcribed with greater eaſe.

Forms of Medicines.

A ſolutive liquor.

Take the leaves of Peach-flowers, of Damask-roſes, of each two Pugils, Broom, Elder, Centaury the leſſer, of each Pugil 1. *the leaves of Agrimony, Roman Wormwood, of each one handful, Senna one ounce, Rhubarb ſix drams, Carthamus-ſeeds half an ounce, Dwarf-Elder two drams, yellow Sanders three drams, Galangal two drams, ſlice them and bruiſe them, put them into a ſilk Bag in a Glaſs, with* 2 *pound of White-wine, Saxifrage-water one pound, Salt of Tartar one dram and a half, let them ſtand* 48 *hours, let the patient drink from four ounces to ſix, every third or fourth day.*

In a hotter Conſtitution let the following form be taken, which I have proved with ſucceſs in this diſeaſe.

Take of purging Mineral waters eight pound, Salt of Wormwood two drams, let it evaporate in a gentle Bath to two pound. To this I uſe to adde four ounces of water diſtill'd from Purgers with Wine; the doſe from four ounces to ſix.

Or to the two pound of evaporated water adde of Mechoacan, Turbith, of each half an ounce, Rhubarb ſix drams, yellow Sanders two drams, Cloves one dram, digeſt them cloſe and warm for two hours: filtre it through Paper, the doſe 3 *or* 4 *ounces.*

Clyſters are of frequent uſe in this Diſeaſe, inaſmuch as they looſen the Belly without any great irritation of the fibres.

Clyſters.

Take of the Infuſion of Stone-horſe dung with Cammomile-flowers a pound, Mellis Mercurialis two ounces. After the ſame manner Decoctions and Infuſions are prepared, with Carminatives, from Dogs-dung.

Take of the Emollient Decoction one pound, Sal Prunella, or Sal Armoniack from one dram to a dram and a half; make a Clyſter.

Take of ſound Urine one pound, Sal Prunella one dram, Venice *Turpentine diſſolved with the yolk of an Egge, an ounce and a half: make a Clyſter.*

Diureticks.

2. Diureticks if any other Remedies promiſe help in this Diſeaſe.

Take of Millepedes living and cleanſed three ounces, one Nutmeg ſliced, bruiſe them together, and pour upon them one pound of the Diuretick-water preſcribed below: Preſs them ſtrongly, the doſe from three ounces to four twice a day.

Diſtilled Waters.

Take of green Juniper-berries, and Elder-berries, of each ſix pound, of Firre-tops four pound, green Walnuts two pound, Cortex Winterani four ounces, the outer Rinds of ſix Oranges and four Limons, Seeds of Ameos, Rockets, Creſſes, of each an ounce and half, Dill-ſeeds two ounces, ſlice them and bruiſe them, and adde of Poſſet-drink made with White-wine 8 *pound, diſtill it in common Organs, let the whole liquor be mixed.*

Pills.

Take of Cryſtal Mineral half an ounce, Volatile Salt of Amber, two drams, the powder of Carrot-ſeeds one dram, Turpentine of Venice *what ſuffices to make ſmall Pills, the doſe Numb.* 3. *in the evening and morning, drinking after it three ounces of the diſtilled water.*

Spirits.

Take of the ſweet Spirit of Salt half an ounce, take ſix drops to twelve, twice in a day, in a draught of the ſame water, with a ſpoonful of Syrup of Violets.

Take of ſpirit of Salt of Tartar one ounce, take one ſcruple to half a dram, twice a day, after the ſame manner; So alſo ſpirit of Nitre, and Tincture of Salt of Tartar may be taken.

An Expreſſion.

Take of Plantane, Chervil and Clivers-leaves, of each four handfuls, bruiſe them, and pour

pour on them a pint of the former diſtilled water. Preſs them ſtrongly, the doſe three ounces, twice or thrice in a day with other Medicines.

Take of Graſs-roots three ounces, of Butchers-broom two ounces, Chervil and Eringo candied, of each one ounce, ſhavings of Hartſhorn, Ivory, of each two drams, of burnt Hartshorn two drams and a half, Burdock Seeds three drams, boyl them in three pound of Spring-water to two pound, in it ſtrained hot, infuſe the leaves of Clivers, Water-creſſes, bruiſed, of each one handful, adding of Rheniſh wine ſix ounces, make an infuſion cloſe and warm for two hours, after ſtrain it again, and adde of Magiſtral-water of Earth-worms two ounces, Syrup of the five opening Roots an ounce and a half. Make an Apozeme, the doſe four ounces twice a day, with ſome other medicine. *Apozems.*

While theſe are taken inwardly, alſo Topicks and outward Applications may be careſully adminiſtred; not thoſe which are hot and diſcuſſing, but thoſe which are endowed with particles of a volatile Salt, and Nitrous, to wit, thoſe which deſtroy the Combinations of other Salts, and diſſolve the impactions of the Spirits, for which we propound the enſuing things. If Fomentations ought at all to be admitted into uſe, let them not be applyed too hot, alſo let them be prepared not of thoſe that are uſually call'd Carminative, but chiefly of Salts and Minerals. *Cabrotius* (cited by *Helmont*) ſays, *That he cured one of* 80 *years of age, whoſe Belly he fomented twice a day with a Lye, in which he boyled Salt, Alum and Sulphur, and after applyed Cow-dung for a Cataplaſm.* I uſe to preſcribe theſe enſuing. *Topicks.*

Take of flowers of Sal Armoniack one ounce, Cryſtal mineral two ounces, Spirit of Wine ſmall and imbued with much Phlegme two pound, mixe and diſſolve them in a glaſs. *A fomentation.*

Let a woollen Cloth dipt into this warm be applyed upon the whole Abdomen, and then let it be changed, wetting it again; let it be done for the ſpace of half an hour twice a day, afterwards let there be applyed a Cataplaſm of Cow-dung, with the powder of Dogs turd, or the following Plaiſter.

Take Empl. Diaſaponis, that is, de Minio, *with* Venice *Soap, let it be ſpread thin upon limber Leather, and applyed to the whole Belly, to be renewed once in ten or twelve dayes.* A *Plaiſter.*

II. The ſecond *Indication* requires moſtly alterative Remedies, to wit, thoſe which ſtop the fermentations of the humours in the bowels of the nether Belly, and the Orgaſms and irregular excurſions of the Spirits, alſo thoſe which procure equal mixtions and due motions of the Chyle and nervous Juice: for which end Chalybeates are chiefly in uſe. And truly it is wont not only in this, but in many other ſplanchnical Diſeaſes, to have reſort to the Medicines of Iron, as if from thence to fetch the ſharpeſt weapons; whenas many Empiricks and Quacks, who preſcribe theſe things confidently and dogmatically, obſerve not by what way ſuch a Medicine doth operate, or what alterations for the better may be lawfully expected from thence: wherefore, while Iron, changed into Medicine, although the Sword of *Goliah*, is ſnatcht and brandiſht by a blind man, it is no marvel if it prove in vain, or if in the ſtead of the diſeaſe, which is an Enemy, Nature it ſelf is ſometimes hurt; and truly frequently it happens ſo, when Chalybeats, of which there is great variety, and diverſity of operations, are adminiſtred without any choice or difference either of the temperament or conſtitution in the Patient, and reſpect to the ſtate of the Diſeaſe. *The ſecond Indication.* *Of Chalybeate Medicines.*

Of Medicines prepared of Iron or Steel, and of their vertues and manner of working, we have in another place treated, and there is no need here to repeat the ſame things. For this diſeaſe, if any of them, not all of them are fit; for thoſe in which the frame of the mixture being opened, the Sulphur remains ſtill, and being looſened predominates over the reſt, they are altogether to be excluded from this number; for they do much ferment the Juices of the bowels with their notable fermentation, and do ſo exagitate the Blood and Spirits, that the whole Region of the nether Belly is lifted up into a greater bulk, as if by a certain Spirit thronging violently into it. *What preparations of Iron are not convenient.*

Neither here are they fit, from which the ſulphureous particles together with the ſaline are chaſed away, as in *Crocus Martis* prepared by long and ſtrong Calcination. For this Medicine as it is conducing to ſtop all fluxes, rather fixes any impaction of Humours and Spirits, and renders them more obſtinate.

What ſort may be admitted.

But there remains a Martial Remedy of a middle kind, wherein the Sulphur being wholly or for the moſt part expell'd, a vitriolic Salt remains and predominates: as indeed it is in the ſolution of the filings of Iron, or in a ſimple Infuſion, or in Mineral water, in the Salt or Vitriol of *Mars*, in our preparation of Steel, with many others; out of which medicines, being prepared or compounded, we find by often Experience that in ſome caſes, they contribute notable help. For theſe deſtroy the exotick ferments of the bowels, and reſtore the native ferments; they open their obſtructions, they fix the blood, and reſtrain its conſiſtence from too much diſſolution; wherefore Chalybeate remedies, after the ſame manner as certain other alteratives, do perhaps ſomething profit againſt the procatarctick, and more remote cauſes of a Tympany; but as to the conjunct cauſe, they contribute little or no ſuccour.

Forms of Chalybeates.

Take of our Steel finely prepared two drams, the diſtilled water above preſcribed two pound, Syrup of the five Roots two ounces, mix it in a glaſs, let it clarifie by ſettling, the doſe three or four ounces, in the morning, and at five afternoon.

Take of the Powder of Aron-roots, Crabs-eyes, of each three drams, Cryſtal Mineral two drams, Vitriol of Mars *a dram and a half, Sugar of Roſemary-flowers two drams, mix them, the doſe half a dram twice in a day with a convenient vehicle.*

A liquor of the flowers of Tapſus Barbatus.

Hartman doth wonderfully magnifie the liquor of the flowers of *Tapſus Barbatus* or Mullein, as a ſpecifick remedy in this diſeaſe, by putting the freſh flowers into a Veſſel, being ſtrongly preſs'd, and put into an Oven with bread being cloſe ſtopt, afterwards the Liquor being ſtrained, let it be diſtill'd *in Balneo*, the doſe one Scruple in the Decoction of Fennel-ſeeds and Roots. Surely this Medicine, if it doth effect any thing, ought to be given in a larger doſe.

Johannes Anglus commends an Electuary of *Roſata Novella* with *Diatrion Santalon*, and *Egges of Ants*, which remedy ſeems to promiſe ſomething probable enough. In imitation of this I here propound this enſuing.

An Electuary.

Take Conſerve of Chichory flowers, of Indian Creſſes, of each three drams, powder of Aron-roots, Lignum Aloes, yellow Sanders, of each one dram, Crabs-eyes one dram and a half, Salt of Wormwood one ounce, Ants Egges one ounce, the liquor of Tapſus Barbatus half a dram, with a ſufficient quantity of Syrup of Citron-rinds make an Electuary, the doſe two drams twice in a day, drinking after it of the former diſtilled water, or of the following Julep three ounces.

A Julep.

Take the water of the leaves of Aron, of the Juice of Elder-berries, of the water of Juniper and Elder-flowers, of each ſix ounces, the magiſtral water of Snails, and of Earth-worms, of each two ounces, Syrup of the Juice of Elder-berries two ounces, mix and make a Julep.

Third Indication.

III. The third Indication Vital preſcribes Remedies againſt fainting of Spirits, and difficult breathing, and againſt Watching and Thirſt. We will briefly annex certain forms of either kind.

1. Cardiacks.

Cordials.

Take of the water of Napha, *Marygolds, Camomile, of each three ounces, of Dr.* Stephan's *water two ounces, Tincture of Saffron two drams, Sugar one ounce, Pearls one dram, make a Julep, the doſe four or five ſpoonfuls three times a day or oftner in faintings.*

Take Conſerve of Marygolds two ounces, Confection of Alchermes, and de Hyacintho, *of each two drams, prepared Pearl one ounce, Syrup of the juice of Citrons, enough to make a Confection, take the quantity of a Nutmeg evening and morning, drinking after it a draught of the Julep.*

2. Hypnoticks.

Hypnoticks.

Take of Aqua Hyſterica *ſix drams, Syrup* de Meconio *half an ounce, mix them, and take late at night.* Or,

Take of ſmall Cinnamon-water one ounce, Diacodium three ounces, Tincture of Saffron two drams. Mix them, and take one ſpoonfull at night, if ſleep be wanting. Or,

Take

Take Syrup of Cowſlip-flowers three ſpoonfuls, compound Pœony-water one ſpoonful, Laudanum tartarized one dram, take one ſpoonful, if Watchings require it.

3. Extinguiſhers of Thirſt, in this Diſeaſe being very thirſty, ought frequently and in ſmall quantities to be adminiſtred, that that troubleſom ſymptom may be reſtrained without much drink, which is perpetually pernicious. For which purpoſe, *Things mitigating Thirſt.*

Take of Conſerve of Wood-ſorrel paſſed through a Sieve three ounces, Pulp of Tamarinds two ounces, Sal Prunella one dram, with a ſufficient quantity of Syrup of the juice of Wood-ſorrel, make a Lohoch, of which let him lick often.

SECT. II. CHAP. V.

Of an Anaſarca.

NOw two kinds of Dropſies, *viz.* Aſcites and Tympanie (according to common reckoning) being finiſht, although the third, to wit an *Anaſarca* (for that it is an affection rather of the whole body, than of the nether Belly) appertains not properly to this place, notwithſtanding the Pathologie thereof having ſome affiance with the former, we think fit to deliver here alſo its Cure in ſhort. An Anaſarca is deſcribed after this manner, *That it is a white ſoft Tumour of the whole outward Body, or of ſome of its parts, yielding to the touch, and leaving a dent upon compreſſion,* proceeding from a watery humour extravaſated, and accumulated as well within the interſpaces of the Muſcles, as within the pores of the fleſh and skin, yea of the Glandules and Membranes. *The deſcription of an Anaſarca.*

It differs from an Aſcites as to its outward form and appearance, yet not as to its morbific matter, which being the ſame in both diſtempers, as it is heaped within the greater or leſſer hollowneſſes, it gains divers Appellations of the Diſeaſe. *How it differs from an Aſcites.*

The watery humour procuring an Anaſarca, doth proceed altogether or for the moſt part from the blood; for it being continually produced within the maſs of blood by the fault and defect of ſanguification, it is poured out in greater abundance from the extremities of the Arteries, than can be received, or brought back by the Veins, or the Lymphaducts, or can be diſcharged by the Reins or pores of the skin, and other vents of the ſerous Juice. *The Original from the blood.*

From theſe it follows, that the material cauſe of this Diſeaſe is a watery humour, and the efficient is blood, which engenders waters and depoſits them in the places affected. We will exactly weigh the reaſons of either of them, and the manner of becoming and effecting it, and firſt we will treat of the efficient Cauſe of an Anaſarca. *The material and efficient cauſe.*

1. The affection of the Blood, or rather the Hydropical brood, conſiſts in theſe two things, to wit, Firſt by reaſon of a failure or fault of ſanguification, it doth not rightly aſſimilate the nutritious Juice perpetually infuſed into its maſs, but ſuffers it to degenerate into a watery humour: Then ſecondly by reaſon of the too looſe mixture thereof, it doth not retain that humour, ſo degenerated, ſo long within its conſiſtence, untill it might be diſcharg'd through fit Emunctories or Emiſſaries, but lets it out every where near to the ends of the Arteries, into the inter-ſpaces of the Veſſels, and there leaves it. Either of theſe vices of the Blood we will conſider a little more. *The Blood its efficient cauſe in a double reſpect.*

In the firſt place as to the former, for the moſt part it is confeſſed by all, that the Blood it ſelf and not the Heart or Liver ſanguifies, by what of late is plainly underſtood concerning the functions of theſe parts; yet by what means the Blood aſſimilates Chyle infuſed to it ſelf, and converts it into freſh blood, to be beſtowed to ſo many and diverſe ſorts of uſes, doth not eaſily lie manifeſt to us. But what ſome affirm, that it is made only by the exact comminution and commixtion of particles, and for that cauſe the particles of either kinde being confuſed together, they think, that within the *Firſt that it doth not rightly ſanguifie.*

ſtraiter paſſages of the Liver and Lungs they are kneaded and wrought together as it were with little peſtils, ſeems little probable to me; but on the contrary, I think theſe bowels (as I have ſhewed already) are conſtituted the Organs rather of ſeparation than of mixture; but the reaſon of ſanguification altogether conſiſts in this, that the active particles of the old blood, to wit, the ſaline and ſulphureous, being placed in vigour with the ſpirituous, immediately act upon the like particles of the infuſed Chyle as yet exiſting in an inferiour ſtate, and do ſo ſtir them up and ferment them, that thereupon being extricated from the coverings of the thicker parts, they are carryed into a like degree of exaltation or perfection with the former, and being at length aſſociated with them, and made alſo homogeneous, they put on the ſame nature of Blood; the more thick and heterogeneous particles being removed thence to another place, from thoſe which they had deſerted and gone away from. For truly Sanguification is altogether finiſht by Fermentation, even as the maturation of the Muſt into Wine or Ale; but the reaſon of the difference is, that Wine being ſhut up in the Tub, ſtill remaining entirely in the ſame Maſs, is ſlowly fermented, as to its whole conſiſtence, and is not accompliſhed but in a long ſpace of time; but the Blood conſtituted in a perpetual flux by the loſs of ſome parts and the reparation of others, is fermented by the parts ſtill received freſh, and is generated anew.

The reaſon whereof enquired into.

The reaſon and manner of ſanguification explained.

The old Blood for the moſt part affords the ſame thing towards the freſh Chyle, as Ferment from the flower or fæces of old Ale, being put into new Ale; notwithſtanding as it were by a contrary manner; becauſe the huge maſs of blood being formerly fermented, doth ſuddenly ferment and alter the ſmall portions of the Chyle continually brought in; but the fermenting liquor in Ale in a very little quantity is put to the great maſs of the other liquor to be fermented; which it brings not to maturity under a long ſpace of time. After the rudiments of blood are ſo caſt by fermentation, the concluſion and perfect aſſimilation into blood, is acquired by accenſion; (for ſurely that it is ſo enkindled (as I think) I have formerly ſhewed by demonſtration, which arguments chiefly taken from its proper paſſion, although many have cavil'd at, none have been yet able to overthrow.) Wherefore, while the whole maſs of blood conſiſts of Blood and Chyle confuſedly mixt together, it is fermented while it is circulating; and being divided into moſt minute portions, is ſpread through the whole Lungs, that it might be kindled ſucceſſively according to all its parts, by the nitrous air ſuckt in: for by that means both the vital flame is continued, and all the particles of Blood having as it were paſſed the fire, become more purified, and more agreeable among themſelves; moreover, they are ſo diſpoſed of whileſt they are kindling, that while ſome go into Nouriſhment of the Spirits, of the Nervous Juice and the ſolid parts, and others leſs uſeful depart into the ferments or recrements of the bowels; mean while others being more fixt, abide longer in the maſs of blood, and ſuſtain its conſiſtence, and by fermenting the Nutritious Juice, ſtill engender new Blood, untill themſelves being impoveriſhed, are at length diſcarded, and give place to others that are freſh and luſtie.

An Hydropick temper of the blood ſprings from a double reſpect.

Having ſhewed after this manner by what courſe Sanguification ought to be finiſhed, as well by fermentation as accenſion of the Blood; it will be eaſie to conceive wherein the fault conſiſts producing an Hydropick diſpoſition: To wit, this uſually aſſumes its riſe whenſoever either or both thoſe Conditions requiſite to Sanguification, ether fail, or are perverted.

Viz. Firſt from the defect or fault of its Fermentation;

Firſt therefore this happens more frequently and rather, for that the blood being depraved in its temperature, doth not rightly ferment the Nutritious Juice poured into it, that ſo it might be changed into laudable blood. For when the watery particles predominate with the earthy in the maſs of Blood, the Salt and Sulphur being depreſſed with the Spirit, as all the functions, both Vital and Animal, from thence languiſh and waver; ſo eſpecially Sanguification it ſelf fails and is perverted. For the Juice of the Chyle commixt with the Blood, when it cannot be diſſolved and fermented, with the particles thereof, (after the faſhion of other liquors, as often as being mixt they want ferment,) it degenerates perhaps into a watery, acid, or ropy, or otherwiſe faulty humour, which being afterwards daily encreaſed, and at length riſing to its fulneſs, lyes heavy on the blood, and oft-times almoſt ſtifles its heat; from whence there is a neceſſity that it be forthwith diſcharged by ſome means, and whereſoever it can get vent; but afterwards for that the offices of ſeparation fail in their functions (the ſtock of the animal Spirits languiſhing by reaſon of the diminiſhed proviſion from the influxe of Blood,) the abounding Serum is depoſited

every

every where into the pores, and next vacuities whether greater or leſſer, out of the little mouths of the Arteries; from whoſe daily and great encreaſe, after all the pores are filled, ariſes that as it were fenny habit call'd *Anaſarca* of the whole body outwardly, or of ſome of its members.

Secondly, not only the defect or fault of Fermentation, but alſo of the accenſion of the Blood, induces ſometimes an Hydropical diſpoſition on the maſs thereof: which is clearly diſcern'd, inaſmuch as ſome perſons inhabiting Maritime or mooriſh places, fall into the Dropſie without any other cauſe or occaſion, than that they draw a thicker air endowed with heterogeneous vapours, by which the Nitre is either driven away or obſcured. Therefore the blood becoming degenerate, and vitiated as to its temperature, becauſe it is not duely kindled, nor perfected by efflagration within the Precordia, doth not rightly diſſolve and aſſimilate the Juice of the Chyle, but ſuffers it to be perverted into a watery liquor. But although in the firſt place, the blood being depraved for this reaſon, ſometimes loſes its fermenting vertue, and therefore the rather and more immediately procures a Dropſie; notwithſtanding it is manifeſt, the firſt fault thereof aſſumes its origine from unwholſom air ſuckt in, and not duely enkindling the Blood; becauſe ſuch Hydropicks removing their reſidence into Sunny and Mountainous places, recover their health without any other Medicines.

Secondly, from defect of Accenſion.

Hitherto of the neareſt Cauſes of an Anaſarca and which are conjoyned to the Diſeaſe it ſelf, which namely are the depravation or defect of the maſs of blood, chiefly as to its fermentation, and in ſome meaſure as to the enkindling thereof; which latter is ſcarce wont to be effective but when it follows the former: But what remains as to the more remote and procuring cauſes of this Diſeaſe, to wit, from which the defermentative affection ariſes (that I may ſay no more of the defect or depravation of its enkindling;) I ſay that theſe appear ſo diverſe and many, that I judge it hardly poſſible to recite them all particularly; notwithſtanding, very many or at leaſt the chief may be reduced to theſe three heads: to wit, For that the watery diſtemperament of the blood doth ariſe, inaſmuch as its active Principles, *viz.* Spirit, Salt and Sulphur, are not inveſted with their fermenting and ſanguifying force or vertue, I account this to come to paſs, either Firſt becauſe thoſe particles are too much waſted by their great expences; or Secondly becauſe they are not repaired by convenient and proportionate Refections; or Thirdly, for that they are overwhelmed or obſcured by ſome other duller or heterogeneous Particles being too much accumulated in the maſs of Blood: We will a little weigh the Reaſons and ways of each of theſe their coming to paſſe.

Reduced to three heads.

In the firſt place, the former of theſe is evidently diſcerned in frequent and inordinate Hæmorrhages, whereby many men, although ſtrong and formerly healthy, are immediately enclined to a Dropſie, more than from any other accident or occaſion; the reaſon whereof is, that the blood is ſo impoveriſhed, through its more noble Particles iſſuing out in great abundance, that afterwards it can neither duely ferment nor enkindle the Juice of the Chyle brought into it. Moreover, ſometimes the ſame effect ſucceeds (although in a more ſlow degree) from Feavers and other long maladies and languiſhings; to wit, inaſmuch as the blood ſuffering under a long depreſſion, is ſo extenuated and robb'd, that at length it becomes watery and defermentative.

Firſt, becauſe the active particles of the blood, are too much conſumed.

Secondly, the Blood ſometimes deſerting its genuine diſpoſition, declines into an Hydropical one, for that the nouriſhment being more ſlender than it was wont, or ought to be beſtowed upon it, its active and ſanguifying Particles are not enough repaired within its maſſe; for ſo we have obſerved, that ſome who have uſed themſelves to Wine and ſtronger Drink, after they have been reduced to homely Diet, and ſmaller drink, of water or ſmall beer, ſuddenly have become Hydropick. It is a common obſervation, and frequently true, although of ill omen, that Drunkards, and daily drinkers, if that wild Cuſtom be left, at length becoming ſober and abſtemious, are much in hazard, leſt by reaſon of the uſual fermentation of the blood being depreſſed, they become obnoxious unto that Diſeaſe. I knew a notable Drunkard, who declared that a Prieſt very learned and Pious was guilty of his death, becauſe he gave him admonition to Temperance, and to leave his Drunkenneſs, and he complying therewith, incontinently fell into a mortal Dropſie.

Secondly, becauſe they are not enough repaired.

But the third cauſe or occaſion diſpoſing to that Diſeaſe, the moſt common and notable, conſiſts in this, that the active Particles of the Blood, being involved with other

Thirdly, becauſe they are buryed in duller particles.

other more dull or heterogeneous ones, or being diſſipated from one the other, loſe their fermentative power, or cannot enough exerciſe it. But ſuch an affection of them, as it is wont to be raiſed from various cauſes and accidents, ſo chiefly from theſe, three, one while ſolitary, another while united together; to wit, Firſt from the Non-naturals immoderately received: Secondly from the Naturals unduely retain'd; or Thirdly, from the Preternaturals corruptly generated in the body.

Whereof there are three cauſes.

Firſt from Non-naturals immoderately ingeſted.

The errors of Diet deſervedly may be referred to the firſt rank of theſe (whereby the ſtock of that Diſeaſe is always moſt abundant) For it is a common Prognoſtick and in every bodies mouth, that Gluttons and great Drunkards dye at length of a Dropſie: to which moreover, not only Surfeits and immoderate and daily Tiplings incline, but alſo frequent and unſeaſonable Treats; and moreover the continual pouring in of abſurd and hard to be digeſted Nouriſhment. For from the evil courſe of Diet of each kind uſed any while, whenas the Juice of the Chyle, oftentimes crude, incongruous, and above meaſure plentiful, is poured into the maſſe of blood, it of neceſſity follows, that it is firſt burdened, and afterwards its Conſiſtence being looſened, the more noble Particles being forced aſunder, it is ſo involved, or abated by the other heterogeneous ones, that being hindred, it deſiſts from its fermentative or ſanguifying virtue; inſomuch that the bowels being in a ſhort time hurt by its aſſaults, a Cachexia, and then a Dropſie followes, whereof that is alwayes a forerunner.

Secondly, From Naturals unduely retained.

Secondly, in this place are put all ordinary, accuſtomed and ſolemn Evacuations ſuppreſſed. It is obſervable enough, that a Cachexie, and often a Dropſie, doth ariſe from a menſtruous or Hemorrhoidal flux diminiſhed or ſtopt, no leſs than from a too immoderate one, (by reaſon of the fermentation of blood impeded by the heterogeneity of Particles.) Moreover, the ſame is often wont to be effected from Iſſues ſuddenly ſtopt, or eruptions of the Skin ſuddenly repercuſs'd. Laſtly, ſuppreſſion of Urine, and ſweating much hindred, do render the blood more watery, by an immediate and neceſſary affection, and incline to the Dropſie. Alſo it is an obſervation frequent enough of healthful Perſons, who being compelled for ſome time to abſtain from going to Bed, that their feet have ſwoln.

Thirdly, From Preternaturals generated in the Body.

Thirdly, Preternatural things generated within the Body, but eſpecially Tumours and Humours do hinder the motion of the blood, or pervert its temper, and ſo induce an Hydropical diſpoſition. Tumours ſtirred up in ſome place about the Bowels, inaſmuch as they hinder or ſtraiten the circuit of the Blood, do cauſe its Serum to be there extravaſated, and poured out; by the accumulation whereof within ſome cavity, in the firſt place an Aſcites (as we have ſhewn above) and at length an Anaſarca a conſequent of that doth frequently enſue. Moreover, Humours of divers ſorts being engendred in divers places within, and transferred into the blood, do firſt pollute the maſſe thereof, and defile it with heterogeneous Particles, whereby at length it is ſo depraved in its temperament, that it perverts the Juice of the Chyle brought in (when it cannot further ferment and aſſimilate it) into an hydropical liquor. For this reaſon, nothing is more uſual than that Conſumptive perſons, and thoſe that are affected with ſtrumous and cancrous Ulcers, nay of any ſort within the Reins, Meſentery, Guts, or other Bowels of the lower Belly, after they have been long conſuming, dye at length hydropical.

Different manners hereof are reckoned.

The material cauſe of an Anaſarca is partly the Serum of the Blood, and partly the nutritious Juice.

Hitherto concerning the next efficient cauſe of this Diſeaſe, alſo of the chief remote ones, as well procuring, as evident. But as to what appertains to the material cauſe, it is obvious unto the Senſe, that it is a meer Lympha accumulated within the pores of the Skin, and of the other outward parts; which being depoſited there by the blood (the liquor thereof being partly ſerous, and partly chylous Juice) but failing in Sanguification and Nouriſhment of the body, to which it was deſtinated, it is caſt off like recrements into the vacuous ſpaces of every veſſel. And though the matter of the Dropſie proceed from the Blood and Chyle, yet it is no wonder if it appear neither like blood, nor milkie, but only limpid; becauſe the Urine even of healthful people, after more plentiful drinking, is rendred crude as well as watery; and therefore it is manifeſt, it is nothing changed by the blood, but leaves in that place, whatſoever of colour or thicker conſiſtence it brings to its maſſe. And although a reaſon may be given in either caſe, that the Urine, inaſmuch as it is ſtreined through the Kidneys, and the hydropic matter thorough the pores of the ſolid parts, even ſo become limpid and watery; notwithſtanding it is evident by obſervation, that the watery part of the Chyle, even while it is confounded with the blood, is not intimately mixt with it, but being deprived of its colour and conſiſtency, it remains under the

the form of Lympha, within the pores of the blood; the ſure ſign of which is, that the blood taken from any Animal by Phlebotomy, after being cold it is divided into parts, exhibits a watery liquor (which conſiſts of Serum and Nutritious Juice) plainly limpid, and ſeparate from the other blood. It will be from our preſent purpoſe to enquire any further into the reaſons hereof, and manner of being ſo, and wherefore blood, which being poured into water doth preſently tinge the ſame, and bloodies all ſolid bodies whenſoever it is ſprinkled thereon, yet dyes the Serum of no colour with which it is intimately confounded and a long time circulated.

Why the hydropick humour is limpid and not milkie nor bloody.

From the Ætiologie of this diſeaſe now delivered, the differences of it may eaſily be collected; to wit, firſt it is either univerſal, when the whole habit of the body and all the members ſwell up; or it is particular, wherein for the moſt part the inferiour members only ſuffer, in the mean time the reſt of the body pining away for want of Nouriſhment, which kind of diſtemper, and not a Tympanie, *Proſper Martianus* will have *Hippocrates* ſtyle the dry Dropſie, in which what is reported of the Syren, the dry is joyned to the watery.

The Differences of the Diſeaſe.

Secondly, an Anaſarca whether univerſal or particular, is either ſimple or complicated with an Aſcites; and then either an Anaſarca enſues an Aſcites, or this diſeaſe follows that. Moreover an Anaſarca may be diſtinguiſhed many ways in reſpect as well of the procatarctick as evident cauſes, as we have before intimated; and ſuch differences thereof are found to be frequently of great moment about duely inſtituting the Prognoſtick and Cure.

Wherefore, what relates to the prognoſtick part, this diſeaſe while it is ſimple, proves leaſt dangerous among all the kinds of Dropſies; and a particular one ſeiſing only the inferiour members, ſo that the belly doth not together ſwell with them, is much ſafer than an univerſal one.

The Prognoſticks of it.

An Anaſarca bringing on an Aſcites, wherein for the moſt part the Urine is plentiful enough, and the thirſt not very intenſe, is far more ſafe than an Anaſarca brought in by an Aſcites, wherein the diſeaſed do very much thirſt, and make little, red, and thick, and for the moſt part a lixivial Urine. In like manner it is, or worſe, when an Anaſarca comes upon a Tympanie or a Phthiſis (as ſometimes 'tis wont.) Laſtly, no ſlight Prognoſtick of this diſeaſe is taken from the complyance, or the obſtinateneſs of the Patient, about Diet and Medicine. For whatſoever the condition of the diſeaſe may be, if the hydropick perſon refuſing medicine will indulge his fancy, we may not hope any good from thence.

About the Curatory part to be deſigned in order, two chief Scopes of Healing do occurre, *viz.* Firſt, that the water between the skin be conſumed by ſome means; Secondly, then proviſion muſt be made, leſt it be continually generated and accumulated afreſh; for which purpoſe a Phyſitian is to employ his labour, both that the bowels of Concoction being emptyed of their Superfluities, and free from obſtructions, may always procure laudable Chyle, and ſupply the maſſe of blood in due plenty; as alſo that the blood (the principles thereof being reſtored to its fermentative power) may orderly ferment the Juice of the Chyle continually poured into it, and aſſimilate it into Blood. The vital Indication ſeems not at all neceſſary in this diſeaſe as in many others, for that very rarely in this appear ſwoonings of the Spirits, or Watchings, for which Cordials and Hypnoticks are required; and there is little need of reſtoring Diets, becauſe Faſting and Abſtinence rather help, and oft-times make up the greateſt part of the Cure: the reaſon whereof is, that the Veſſels being emptyed through want, do ſwallow up the waters between the skin, or ſtagnating in other places, and do diſcharge them forth partly by the Kidnies, by the pores of the skin and other Emunctories, and partly do advantageouſly employ them being yet turgid with alimentary Juice, to the nouriſhing of the body.

The Cure of it. Two Indications.

Firſt, That the firſt *Indication* being Curatory, intending an Evacuation of the morbific matter, may be performed, there ought to be exhibited all Hydragogue medicins, as well ſimple as compound; and alſo the forms of medicines recounted and preſcribed in the former Chapter of an Aſcites. Moreover, hereto belong not only Catharticks and Diureticks, but alſo Diaphoreticks, which though in other ſorts of Dropſies they are very much forbidden, often take place in curing of an Anaſarca.

The firſt intends the evacuation of the morbific matter.

In a ſimple Anaſarca we may lawfully adminiſter ſtrong Purgers, and frequently they much profit. And truly this Diſeaſe being cured ſometimes by means of a Cathartick, Empiricks do much glory of their Cures, and certain of their medicines become much cryed up for curing hydropical perſons; for if at any time it happens

By Purgers.

that,

that they have healed one or two labouring with an Anaſarca, by their ſpecifick Hydragogues and Elateriums, it is enough wherewith they may always magnifie themſelves and their Art, although by the ſame medicine they have murdered a hundred Aſcitical perſons. Wherefore, although Preparations of Spurge, or *Elaterium*, *Pilulæ Lunares*, *Hercules Bovii*, and other Hydragogues, have ſometimes profited in ſome caſes; notwithſtanding if they be indifferently exhibited to all Hydropicks, or at all to any endowed with a weak Conſtitution, and Bowels of a brittle tone, or of evil conformation, they oftener cauſe death than remedy: wherefore let it always be committed to the judgment of a prudent Phyſitian, the time when, how long, and what ſort of Catharticks are to be uſed.

Strong Purgers are convenient but not to all.

We have before deſcribed forms of Hydragogue Purgers of every ſort, to wit, thoſe that exerciſe their power upwards and downwards, and as well mild as ſtronger workers, ſo that they may be referred hither, and accommodated to the method of healing now propoſed.

The manner of their working.

But if the reaſon be enquired, after what manner Purgers do operate in this diſeaſe, and why they more happily, and much more efficaciouſly bring out waters than in any other ſorts of Dropſie; I ſay, in an Anaſarca the morbific matter (which is the Lympha) ſubſiſts partly in the maſs of blood, partly in the habit of the body, within the pores and vacuities between the ends of the veſſels; wherefore, a ſtrong Cathartick being adminiſtred, preſently troubles and diſſolves the maſs of blood, and ſtirres it up to the excretion of any ſuperfluous or heterogeneous thing; and irritates alſo the little mouths of the Arteries gaping towards the Cavities of the Inteſtines, that the humour ejected from the blood may eaſier find vent through theſe Emunctories. From hence in the firſt place, the waters fluctuating within the blood are abundantly drained out, afterwards the veſſels being emptyed, do preſently ſwallow up again the waters between the skin, and preſently diſcharge them forth partly by ſiege, and partly by Urine, or Sweat; in the mean time there is no fear left, as in an Aſcites, the morbific matter being driven and poured from the blood, by the Medicine, ſhould be further forced into the places affected, whence not eaſily flowing back again, it ſhould be more largely encreaſed; nor left, as in a Tympany, by reaſon of the Fibres of the Stomach and Guts being too much irritated by the Phyſick, thoſe bowels might be provok'd into convulſive ſwellings. For as long as the bowels are firm and well conſtituted, the particles of the Medicine inflict them with no hurt; but preſently being brought into the blood, they do not only allure waters out of it, but by exagitating the maſs thereof, they raiſe the active particles formerly overwhelmed, and diſpoſe them towards their fermentative power.

Secondly, By Diureticks.

Secondly, Hydragogues working by Urine, as well ſimple as the compound, as alſo forms of Medicines prepared from either of them, and the manner of their adminiſtration, we have alſo deſcribed above, which alſo may be transferr'd hither to ſave repetition. But becauſe not all Remedies of this kind do help alike in all the Diſtempers, it is here obſervable, that for curing an Anaſarca *Lixivials* (as has been frequently manifeſt by our obſervation) do far excell other Diureticks. For indeed now it is a common and thredbare Remedy, for any one having ſwell'd members, after a previous Purge, to take twice or thrice in the day, from ſix to eight ounces of a Lye made of the Aſhes of Wormwood or Broom, made in White-wine, and to continue the uſe of it for ſome dayes. This Medicine moves potently the Urine as I have obſerved in many, yea ſometimes in ſuch abundance, that piſſing the quantity of half a gallon in a day and a night, the Patients have recovered their healths in a ſhort time even to a miracle.

And chiefly Lixivials.

The reaſon and manner of their operation enquired into.

We have unfolded in a former Treatiſe, by what manner and faſhion Diureticks of ſeveral kinds do operate, and after what manner they affect the bowels, blood and other humours: But that in thoſe that labour under an Anaſarca, Medicines endowed with a fixt and lixivial Salt, expell Urine more than thoſe of an acid, alcali, or volatile Salt, the reaſon as I judge is this, *viz.* in thoſe affected with this diſeaſe, after the fermentation and ſanguifying vertue of the blood failing, the watery and crude humours heaped up as well in its maſs as in the habit of the body, do there remain almoſt immovable for a long time, till at laſt they (as the manner is of watery Juices long ſtagnating) do wax ſoure; wherefore the lixivial particles of the Medicine ſpread abroad in the blood preſently boyl up with the acids of the waters, which while they ferment and move, they ſtirre up in the whole maſs of Blood, a notable and excretive fermentation; inſomuch that all the particles being put into motion,

not

not only the watery and superfluous being thrust from the rest, are discharged by the Reins; but also the innate and active particles of the blood it self, unfold themselves from the more gross with which they were involved, and lastly rising up, they begin to resume their fermenting power, and to sanguifie.

Forms of lixivial Diureticks.

Take of the Ashes of Broom or Wormwood, or of the twigs of a Vine calcined to whiteness and sifted, four ounces, put them into a glass bottle with a quart of White-wine, let them digest close stopt and warm for three or four hours, after strain it; the dose from six to eight ounces twice a day.

Take of white Tartar calcined with Nitre, and after melted in a Crucible to blueness three ounces, small Spirit of Wine a pound and a half, water of Snails and Earth-worms, of each four ounces, digest them in a Sand furnace for two days: the dose of the clear liquor from two to three ounces, with four ounces of the decoction of Kneeholm and Burdock-roots in Ale.

For ordinary Drink:

Take of the white Ashes of Broom cleansed two pound, put them into a little Bag, with three ounces of Sassafras, one ounce of lesser Galangal, an ounce and a half of Juniper-berries, and as much of Carrot-seeds, make a bag for four gallons of Ale, after seven or eight dayes begin to draw it.

Diaphoreticks.

3. *Diaphoreticks* do often very notably help in a Leucophlegmatia (which is the commencing or declination of an Anasarca) but in this disease confirmed, they are wont to be more convenient than in other kinds of Dropsies. And although from the beginning they cannot cause Sweats, by reason of the habit of body surrounded as it were with a more thick marsh, however while they exagitate the blood, they cause the innate active particles thereof, being before dormant, and half overwhelmed, to be raised up and disposed towards fermentation, and also they cause all the excrementitious, and chiefly the watery, to be raised into motion, so that presently flowing out of their Receptacles, they may the more readily and easily find way by siege or Urine, and oftentimes in some part by transpiration. But truly after the waters being poured out by purgation, the morbific matter is diminished so much, that the bulk of the body and the swelling of the members begin to abate, the reliques of the humour are best consumed by a moderate transpiration and constant sweating.

Diaphoreticks profit which are taken in a larger dose.

We have described before the number and forms of Hydroticks; as to the present purpose for curing an Anasarca, those chiefly are fit which are given in a larger dose; for they whose quantity is very small, their active particles being overwhelmed in the waters, are lost before being infused into the blood they can exert their strength. Wherefore, Spirits, whether armoniack or vinous, as also Tinctures and Elixirs, yea and powders, are more rarely used in this disease, because they effect little in a lesser dose, and if they be exhibited in a very large one, they often hurt the bowels by their outrage; But those things are rather chosen, which being taken hot, and in a full draught, are able to pass into the whole blood not weakned; of which sort, in the first place are Decoctions of Woods, and Roots, whose particles being agreeable enough to the Blood, and not to be tamed thereby, do pass through the whole mass thereof, and do exert their Elastic power by moving together all the humours.

Forms thereof.

Take of the Shavings of Lignum Vitæ six ounces, Sassaphras two ounces, of each of the Sanders six drams, shavings of Ivory, Harts-horn, of each three drams, let them be infused and boyled in eight pound of Spring-water to half; adding of Calamus Aromaticus, lesser Galangal, Burdock and Butter-Bur-roots, of each one ounce, the leaves of Sage, Germander, dryed, of each two handfuls, let the strained liquor be kept for use; the dose from eight to ten ounces twice in a day warm; to every dose may be added 20 or 25 drops of Spirit of Sal Armoniack drawn with Amber, or of Spirit of Soot, or half a dram, or a dram, of Tincture of Salt of Tartar.

External Hydragogues.

Hitherto of inward Hydragogue Medicines, which cause the Lympha to be drawn forth, either by alluring it inwards towards the guts, or by driving it forth to the Reins or pores of the skin. Besides, there are certain outward administrations in use, by which the water accumulated within the habit of the body are moved toge-

ther, and ſo are either generally diſpoſed to go forth by ſweating, or Urine, or particularly are ſent out forthwith, a vent being made in ſome private places.

The chief Kinds of them, and the manner of their Adminiſtration,

In the firſt rank are placed Frictions, Liniments, Fomentations and Baths as well dry as moiſt: Then thoſe particular things that bring out waters are, Veſicatories, and things that bring the Skin to an Eſchar, and prickings by a Needle. We will treat briefly on each of theſe, or at leaſt of the principal of them, as far as they have reference to this diſeaſe.

1. *Frictions.*

1. Frictions do frequently afford advantagious ſucceſs in a Leucophlegmatia and an Anaſarca: for when the habit of the body is not only filled with a watery illuvies gathered there together, ſo that nothing can evaporate, but that the extern parts grow cold by reaſon of the approach of blood towards them being ſtopt, often and ſtrong frictions do move together the ſtagnating waters, and diſſipate them from thence in ſome meaſure, and alſo recall again the blood by opening the paſſages into thoſe parts from whence it was baniſhed; wherefore, not only the ſwoln members, but alſo the whole body once or twice in a day, is expedient to be rubbed with a courſe Cloth, or with a little Bruſh now ordinarily prepared for that purpoſe.

2. *Liniments, and,*
3. *Fomentations.*

2. 3. With or after Frictions, Liniments and Fomentations are ſometimes convenient. They are prepared either of Salts, and other Minerals diſſolv'd, or from hot and diſcuſſing Vegetables, with the fæces of Wine boyl'd in water, the hot application whereof opens the pores, moves together more amply the accumulated waters, and diſcuſſes them, and alſo enlarges the compaſs of the bloody Circuit, the watery heap being ſomewhat diſſipated. Let the Liniments conſiſt of Sulphur, and Salts of a diverſe kind, or of Quick-lime, and other Minerals, which being powdered and mixed with the mucilaginous Extracts of ſharp Herbs, are reduced into the form of an Unguent; to which let a fit quantity of Oyl of Scorpions be added, for the better conſiſtency. Moreover this Oyl (ſo it be genuine) applyed by it ſelf, doth frequently afford notable help. I knew a Boy much ſwell'd with an univerſal Anaſarca, who was cured by this Remedy alone: for his mother (I know not by whoſe advice) anointed his whole body morning and evening with Oyl of Scorpions, ſtrongly rubbing all the parts with her hot hand; by which act within three dayes he began to pour forth abundance of Urine, and when he had continued piſſing ſo for ſome dayes, the ſwelling vaniſhing by little and little, he became ſound.

4. *Baths.*

4. Baths are not convenient in any Dropſie but an Anaſarca, and not for this unleſs in a Diatheſis or Declination. For ſeeing the Blood from the heat thereof, encompaſſing the whole Body, being made boyling and ſtirr'd up, every where puts in motion the waters formerly ſtagnating, and ſwallowing them up into it ſelf, conveys them variouſly away; the danger is, leſt (as frequently it falls out) receiving them out of the habit of the body into its own maſs, it ſhould depoſe them preſently into the Præcordia or the Brain: for there is nothing more uſual than an affection of thoſe parts, *viz.* an Aſthma or Apoplexie to come upon Hydropicks by unſeaſonable bathing. But when the conjunct cauſe of the diſeaſe (*viz.* a Swelling) becomes moderate, or not much, a Bath of water impregnated with Salts and Sulphur, or a Hot-houſe, by which a gentle Sweat is promoted, is frequently adminiſtred with ſucceſs: As for the Stew it is more expedient, and oft-times notably helps, that the Patients be placed in fitting Seats in Salt-houſes, near the Furnaces wherein Mineral Waters are boyled into Salt.

5. *Veſicatories.*

5. Veſicatories ſend out abundantly the waters between the skin, and often too profuſely. Touching the manner how they operate we will treat more ſpecially hereafter; in the mean time we adviſe, that they are very cautiouſly to be exhibited to Hydropicks, for that Epiſpaſticks of this kind, applyed to the ſwell'd places, do make the Emiſſarie too open, by which apertion the water in the firſt place burſting out, draws oftentimes a great illuvies after it from the neighbouring parts, whence immediately enſues a great proſtration of the Spirits. Moreover, ſometimes the place is ſo ſuddenly emptyed, that being deſtitute of heat and ſpirits, it is in a ſhort time ſphacelated or mortified; wherefore this Medicine is ſeldom applyed to the Legs, or the Feet of Hydropical perſons, where the heat is weak, and the humour greateſt, but ſometimes to the Thighs and Arms with ſecurity (as often as there ſhall be need.)

6. *Eſcharoticks.*

6. *Eſcharoticks* are adminiſtred a little ſafer than Veſicatories, to the ſwell'd places, becauſe from this Emiſſary the flux of waters happens not ſo headlong and abundant at firſt: but commencing moderately grows up by little and little to a great ſtream,

ſtream, which Nature (after that by degrees it is accuſtomed thereunto) endures the better. Moreover, there is leſs fear of a Gangrene from an Eſcharotick than from a Veſicatory, becauſe in that application the part, whoſe union is diſſolved, is defended by the Eſchar againſt the loſs of heat. I have known ſometimes an illiterate and rude Empirick, who frequently by an Eſcharotick did evacuate with ſucceſs the members of hydropick perſons, however ſwell'd, by the enſuing manner: to wit, he fomented the legs evening and morning with the Decoction of Dwarf-Elder, Wormwood, Cammomile and other hot herbs put into the Lees of Ale or Wine; and between the times of the Fomentations he applyed a Cataplaſm prepared of the maſſe of that Decoction with Bran; after he had uſed theſe for three dayes, he covered both legs and feet with a Plaiſter of *Burgundy* Pitch, leaving only a ſmall hole on each Calf, about the bigneſs of a Nut, in which places he put an Eſcharotick, on the bare skin, of the Aſhes of Aſhen-bark: which after twelve hours being removed, a ſmall Eſchar was left, from whoſe pores water was wont at firſt ſlowly to ſweat out, afterwards day by day a little more plentifully to drop out, and afterward (the Eſchar falling off) it uſed to flow out more abundantly as from an open Spring untill it had drein'd the whole leg both beneath and above.

The empirical manner of Eſcharoticks.

7. There remains another manner (not inferiour though leſs uſed than the former) of draining out the waters between the skin, *viz.* by the pricking of a Needle; which likewiſe ought cautiouſly, and minutely to be uſed, leſt a headlong and too great efflux of waters be provok'd thereby. Take an ordinary Needle (ſuch as Taylors uſe) and let it be thruſt into the skin, pricking over the place chiefly ſwelled, only ſo far that blood follow not: and ſo at one time let ſix or ſeven little holes be made, a thumbs breadth diſtant from each other; from every little hole the water will iſſue forth by drops, and ſo it will contiually drop out untill all the ſwelling vaniſh about the place ſo pricked; afterwards, the next time after twelve hours, another while after 18 or 24 hours, let the ſame pricking be exerciſed in another part of the ſame thigh, or of the other; and afterwards once or twice a day in this or that member, or in both together, or in more places, let ſuch Emiſſaries of the water between the skin be excited. For in truth after this manner the hydropick illuvies may be exhauſted more plentifully and ſafely than from any other outward Chirurgery; In the mean time if the new proviſion thereof be provided againſt by inward Phyſick, the diſeaſe will be the eaſier cured. Moreover in a deſperate Dropſie life is beſt prolonged by ſuch an adminiſtration, for that the waters being exhauſted continually by thoſe outward Emiſſaries, the inner inundation of life is longer protracted. Not long ſince an old man aged ſeventy years, overwhelmed with a Dropſie over his whole body, by the help of this Remedy only, remained living for many moneths beyond expectation, and raiſed his head above the waters.

7. Pricking with a Needle.

Hitherto of the Kinds and Forms of Remedies ſuggeſted by the firſt Indication, *viz.* the Curative; what belongs to the other, to wit the Preſervatory, which reſpects the temperature and ſanguifying power of the Blood to be reſtored, it offers Medicines of that ſort which being endowed with more hot and Elaſtick particles, revive the active or depreſſed Principles of the maſs of blood, or cauſe thoſe conſumed to be repaired, for which end Remedies commonly called Altering are wont to be preſcribed under the form of an Electuary, Powder, Pills, diſtilled Water, Julep, Apozeme and Diet, to which alſo Spirits, Tinctures, Elixirs, are ſometimes added, for the better efficacy. We will propound one or two Examples of each of theſe.

The ſecond Indication preſervatory what kind of Remedies it ſuggeſts.

Forms of them.

1. *Take of Conſerve of Roman Wormwood, Scurvy-graſs, the yellow Rindes of Oranges, of each two ounces, Winters-bark two drams, Species Diacurcumæ a dram and a half, of Steel prepared with Sulphur three drams, Syrup of Citron-peels what ſuffices to make an Electuary, the doſe two drams morning and evening, drinking after a draught of the Julep, or three or four ounces of the diſtilled water.*

1. Electuary.

Chalybeate Medicines notably help in this Diſeaſe, as in the green ſickneſs of Virgins, inſomuch that frequently the whole or chief ſcope of curing depends upon this kind of Remedy; yet we are to obſerve, that not all Medicines of this kind are equally convenient in theſe caſes: for thoſe which are chiefly in uſe, *viz. Salt of Steel,* or *Vitriol of Mars,* and others prepared with acids, and deprived totally of Sulphur, do not help, inaſmuch as they do not promote the fermentation of the blood, but rather on the contrary fix it, being too wild or elaſtick. But for an Anaſarca or any watery

Chalybeates profit much in this Diſeaſe.

But only thoſe endued with Sulphur.

watery tumours, in a cachectick habit of the body, Chalybeates of that ſort are given, wherein the ſulphureous particles are left, and are predominant; as in the firſt place the Filings of Iron, and the Scales, reduced into a fine Powder, alſo Steel diſſolved with Sulphur, and powdered. The powders of this being taken, are preſently diſſolved by the acid Salts within our body, whence the ſulphureous metallick particles being ſet free, and brought into the blood, they ferment the whole maſs thereof, and revive the like particles in the ſame, which before lay dormant, and being conjoyned therewith, they give vigour to the blood, and renew its ſanguifying power being formerly depreſſed. Wherefore we may obſerve by uſing but a little Chalybeates of this ſort, the green and yellow colour of the face is converted into a florid.

2. *Powders.* 2. *Take of the compound Powder of Aron-roots, of Winters bark, of each three drams, leſſer Galangals, Cubebs, of each a dram and a half, of Steel prepared with Sulphur half an ounce, Sugar of Roſemary flowers ſix drams, make a Powder, divide it into twenty parts. One part is the doſe, morning and evening, with a draught of the ſudoriferous Decoction before preſcribed.*

3. *Pills.* 3. *Take half an ounce of the gummous Extract reſiding after the diſtillation of the Elixir Vitæ of Quercetane, powder of Earth-worms two drams, leſſer Galangal, Winters-bark, of each one dram and a half, Salt of Wormwood two drams, of Ruſt of Iron two drams and a half, Balſam of Peru one dram, Tincture of Salt of Tartar two drams, Balſamum Capivii what ſuffices to make a maſs to be formed into ſmall Pills, the doſe half a dram evening and morning, drinking after it three ounces of the Julep or the diſtilled water following.*

4. *Julep.* 4. *Take of the water of Elder-flowers, of the juice of their Berryes fermented, of each one pound, water of Earth worms magiſtral, of Rhadiſh compound, of* Aqua Mirabilis, *of each two ounces, Syrup of the juice of Elder-berries two ounces, mix them and make a Julep.*

5. *Diſtilled water.* 5. *Take the leaves of Garden Scurvy-graſs, of Hedge-Muſtard, of Pepper-wort, of each ſix handfuls, of the Roots of Calamus Aromaticus, Galangal, of* Zedoaria, *Orris of* Florence, *of Elder, Aron, of each ſix ounces, Winters-bark,* Jamaica *Pepper, of each three ounces, Juniper-berries four ounces, Cloves, Ginger and Nutmegs, of each one ounce, ſlice and bruiſe them, and pour upon them eight pound of old Rheniſh-Wine; diſtill it in common Organs, let the whole Liquor be mixt.*

6,7. *Decoction.* 6, 7. An Anti-hydropick Decoction is deſcribed above, among the Diaphoreticks. A Diet-drink is to be taken inſtead of Ale, and is to be made according to the enſuing form.

Diet-drink. *Take of Shavings of Guaiacum, Saſſafras, of each four ounces,* Florence *Orris-roots, Calamus Aromaticus, Galangal, Enula-campane, of each one ounce and a half, of Juniper and Bay-berries, of each two ounces, Anniſeeds, Carue, Sweet fennel, Coriander and Dill-ſeeds, of each one ounce, long Pepper and Cubebs, of each an ounce and a half, Cloves, Nutmegs and Ginger, of each half an ounce,* Jamaica *Pepper two ounces, the dryed leaves of Sage, Wood-ſage, Calamint, Agrimonie, of each one handful, Liquoriſh four ounces ſliced and bruiſed, boyl it in four gallons of Spring-water to half, the ſtrained liquor being cold, let it be kept in glaſs Bottles for uſe; with the conſtant uſe of this drink, I have known many labouring with a deplorable Anaſarca to be made well. Among many Examples of Dropſies cured, I ſhall propound but one.*

An Example of the Cure of an Anaſarca Dropſie. A certain ſtrong man of a middle age, after he had contracted an Epidemical Quartan Feavour, and being evilly handled from its beginning, had laboured with it above a year, and in the mean while had uſed an ill courſe of Diet, fell into an Anaſarca, which afterwards in a ſhort ſpace augmented hugely, by reaſon he indulged himſelf more freely to drink for quenching his thirſt (which was outragious) ſo that all his members being ſwollen from head to foot, and over the very Abdomen it ſelf, he could not turn in his bed from ſide to ſide without help.

The Prognoſtick and Cure of the Diſeaſe. When I firſt viſited this man, and deſpairing of a Cure (as the Phyſitian in *Celſus* lib. 3. Chap. 21. *who denyed that any intemperate Hydropick could poſſibly be cured*) I immediately affirmed this Prognoſtick, *That he would dye in a ſhort time unleſs he abſtained from drink.* Whereunto he replying, profeſt he would not drink in a weeks

weeks ſpace, provided he might be helped; and indeed did as he ſaid, although being very thirſty, for ſix or ſeven dayes he ſcarce took any liquid thing in his mouth, but what was Medicine; and during that time, when in the mean while he took Hydragogues, Catharticks and Diureticks, and any other things preſcribed carefully, he became much better, and afterwards the method (before deſcribed) ſomewhile being adminiſtred, he was reſtored to his entire health, and even now though five years ſince lives and continues ſound.

The Concluſion of this Section.

There remain certain other ſplanchnical Affections, touching the Remedies whereof, according to the enſuing method, we ſhould here have treated, notwithſtanding I have performed this task already for the moſt part under other titles; for as is above intimated, Remedies which concern the Kidnies we have for the moſt part unfolded under the rank of Diureticks, and thoſe which concern the Stomach and Guts, under that of Vomits and Purges; what relates to the Spleen we have finiſhed in the Hypochondriac Pathologie; and what to the Womb in the Hyſterical. As to what appertains to the Genital parts and their Diſeaſes, and help, I reſerve for another time and place; it behoves me now next of all, after treating hitherto of the inward Pharmacie, to diſcourſe ſomething of the outward, and of the Reaſon or Ætiologie of the adminiſtrations thereof, which ſhall be done in the next Section, beginning with Phlebotomie, that great Remedy.

SECT.

SECT. III. CHAP. I.

Of Phlebotomie.

Phlebotomie a very general and ancient medicine.

AMong the universal Documents of Philosophie, or aids of Physick, none either in Theory or Practice hath been more ancient or general than the speculation of the Blood and letting it out by opening a Vein. As to the former we have in other places often explicated the nature and constitutive parts of the Blood, we have unfolded the Virtues and Energy of the same, and have demonstrated that it is in truth enkindled, and that from the burning thereof the flame of animal life, as of a Lamp, doth begin and receives continuation: But as to what relates to Phlebotomie, all Authors of every age have made mention thereof: Moreover the same was ever in Medicinal use with all Nations howsoever barbarous or rude. Neither is it a wonder, for truely Nature it self in the first place hath taught the necessity, and way of that part of Chirurgery; Even the Divine Law commanding the Rite of Circumcision, as a Symbol thereof, seems to intimate that the innate impurities of Humane Nature ought to be purged in some manner by letting out the blood.

Nature shews it by Hæmorrhagies.

That we may methodically discourse of this great Remedie, we ought first to consider, by what means, also for what causes and ends, the letting of blood either happens spontaneously to Nature, or is indicated by the Physitian; then secondly we will annex the chief effects of this Evacuation, as well good as bad, whether advantageous or disadvantageous, and together propound certain Rules and Cautions to be observed, about due administration of Phlebotomie.

As to the former, spontaneous Hæmorrhagies (which suggest the use of Phlebotomy) whereas they are manifold and of diverse kinds, they are usually reduced to these two heads or ranks: to wit, they are denominated either critical, Nature endeavouring something good and wholsome; or symptomatical, which for the most part happen, she being dejected from her government, and being altogether out of order. The bloody eruptions of the former kind are again distinguished; that they are either raised without a Feaver, and are either periodical, which happen often at set seasons, as the Flowers in Women, and the Hemorrhoids in some, and in others the solemn or otherwise accustomed opening of the Nostrils; which very often succeed according to the great changes of the Year, or alterations of the Air: or they are fleeting and uncertain, as when blood doth advantageously break out of those places, and of many others, one while in this part, another while in that part of the body. Moreover, bloody Crises do sometimes happen in a Feaver, and do often put an end to it, as *Hippocrates* long ago observed, and is now manifest by very common observation. The blood breaks out in all these cases, inasmuch as being turgid, and above measure rarified within the vessels, it desires a larger space, wherefore, unless some portion thereof give way, the whole mass runs the hazard of being constipated, and as well the motion thereof to be hindered, as the enkindling to be suffocated, and the temperature to be perverted.

Critical either with or without a feaver.

The causes thereof proceed either,

For there are two chief Reasons or Causes, wherefore such turgescencies of the Blood do arise: inasmuch as its liquor is as well inflammable, as fermentative.

1. *From the kindling of the blood.*

1. As to the former of these, that the Blood may be duely enkindled for the supporting Life, and the due exercise of the functions thereof, it behoves that the innate sulphureous particles of it be proportion'd unto the Nitrous adventitious ones from the Air. Therefore as often as the Blood being very boyling and rarified, is much opened and loosened in its own consistence, so that the Sulphur being dissolved, is kindled in greater plenty, there is a most frequent and painfull breathing instituted for the drawing in of a more plentifull Nitre: Now if the Sulphur abounding in this manner, cannot be wasted by burning, nor the vital flame regulated, the next course immediately to diminish the sulphureous fuel, is, that a certain portion of the rarified Blood have vent. From hence, not only in Feavers, but after drinking Wine, Bathings, being in the Sun, and other accidents by which the Blood grows very turgent, either an Hæmorrhagia of its own accord succeeds, or there is often need to supply the defect of such a spontaneous evacuation by Phlebotomie. But that such

kind

kind of effuſions of Blood, whether made by Nature or Chirurgery, are commonly reported to bridle its heat or raging; really they do this only inaſmuch as they diminiſh the kindling of the blood, by withdrawing part of the ſulphureous fuel, as Oyl from a Lamp.

2. But moreover in the ſecond place, the Blood, inaſmuch as it is a fermentative liquor, it is apt alſo to be extravaſated. Namely, if at any time any heterogeneous thing, and not miſcible, be confounded with its liquor, it grows hot very much, like Wine in a Veſſel, and boyls up in the Veſſels to exclude that diſagreeable thing, which if it can neither ſubdue, nor turn off by Sweat, Urine, or otherwiſe, the Blood it ſelf excludes part of it ſelf as a Vehicle for carrying that matter forth, whereſoever a vent is to be found. For this reaſon (*viz.* that any diſagreeable or indomitable thing may be turn'd out of the maſs of blood) divers ſorts of Hemorrhagies happen, as well in Feavers as without them; all which are excited by Nature for an intention of good, as alſo thoſe by which the too much enkindling of the Blood is depreſſed: But that frequently it happens otherwiſe, ought to be imputed to divers accidents and circumſtances. But for the moſt part the failure about the ſpontaneous Hemorrhagies critically inſtituted, is either in the firſt place becauſe the blood while it is boyling knows no meaſure of flowing out, and therefore being ſtirr'd into violence, it flows out too much; or ſecondly, becauſe the mouths of the veſſels once opened do not preſently cloſe again, nor are able to be ſhut; or Thirdly, becauſe Nature endeavouring an excretion of blood, doth it by places more open, but often inconvenient; as when an Hemorrhage happens through the Lungs, the Kidneys, Guts, or other Bowels, which therefore paſs from a Critical into a Symptomical and often into a malignant Hæmorrhage.

2. From its Fermentation.

1. Critical Hemorrhagies ſometimes turn into ſymptomatical.

Neither only by theſe means, but by many other failings of Nature, or impediments, do Symptomatical Hæmorrhagies happen, in all which either the Blood it ſelf, or the Veſſels containing it, or both of them together, are wont to be chiefly in fault.

2. Symptomatical Hemorrhagies ariſe either,

1. In the firſt place, the Blood, beſides the reaſons above mentioned, (to wit, forasmuch as it becomes inflammable or fermentable above meaſure) is apt alſo to be extravaſated, becauſe either its liquor being empoiſoned, or otherwiſe corrupted, cannot retain its due mixture, but being apt to coagulate or putrifie, divides it ſelf into parts; and whilſt ſome of them being here and there planted, ſending forth ſpots, wheals, and other brands of Malignity, do diſcolour the Fleſh and the Skin, and obſtruct the proper paſſages; others otherwiſe running out and breaking forth whereſoever there is a vent found, do produce bloody Excretions in divers places, as is commonly diſcerned in the Plague, Small-pox, Meaſles, and malignant Feavers; yea perhaps this in ſome meaſure is the reaſon why in ſcorbutick Diſtempers, as ſpots and marks, ſo alſo Hæmorrhagies are ſo familiar.

Firſt by the fault of the blood.

2. Secondly, The veſſels bringing Blood being faulty many and divers ways, but chiefly in theſe three, do appear the cauſe of a ſymptomatical Hæmorrhage, *viz.* In the firſt place, if perhaps any where ſome of them are obſtructed, as often as the blood aſſumes a more rapid motion, either in the ſame place, or in the contiguous parts, and alſo ſometimes in remote parts it is conſtrained to burſt out. Frequently from ſuch a cauſe an Hæmoptoe proceeds; moreover Spitting of blood, and the Hæmorrhage of the Noſtrils do often follow the ſuppreſſion of the Terms and Hemorrhoids. Secondly, the little mouths of the veſſels (by reaſon of the fleſhy Fibres being looſened or reſolved by which they are clos'd) ſometimes are ill formed, ſo that when the ends of the Arteries do gape too much, the little mouths of the veins do cloſe. By reaſon of this affection, Scorbutical and Cachectical perſons, are found obnoxious to Hæmorrhagies, as we have remarkt in another place. But Thirdly, it frequently comes to paſs that the Veſſels, being ſo evilly formed, are alſo convulſively affected, and ſo the morbific cauſe being as it were doubled, this evil is much encreaſed, inſomuch that the muſcular fibres of the Veſſels being inordinately contracted, cauſe ſudden and violent fluxes of the blood, one while towards the upper parts, another while towards the lower; and ſo their little mouths being open in the mean time, they provoke prodigious Hæmorrhagies. For I have obſerved in ſome perſons, when the current of blood was ſmall enough, with a ſmall and weak pulſe, the Convulſions of the Veſſels generated in ſome place, and propagated under the likeneſs of wind running to and fro in the body, to drive more impetuouſly the blood, however ſlow of it ſelf, and to conſtrain it into violent eruptions; and in caſes of this ſort,

Secondly, The fault of the Veſſels, for that they are ill formed.

Thirdly, Forasmuch as they are convulſively affected.

ſort, when Phlebotomies and Medicines refrigerating and tempering the blood have not at all profited, the greateſt relief hath been found from Narcoticks, Antiſpaſmodicks and Ligatures.

3. From the blood and veſſels being both in fault.

3. Thirdly, If perhaps it ſhall happen that theſe faults of the Blood and Veſſels are complicated, and put forth their miſchiefs joyntly at once; from thence it will be of neceſſity that this evil will be more intenſe, and more frequent and prodigious Hæmorrhagies will be raiſed; the reaſons of which as they appear plain enough by what goes before, it will be neither neceſſary nor ſeaſonable here longer to dwell upon explicating of them; but rather, whereas we have deſigned hitherto the acts of Nature about ſpontaneous effuſion of Blood, and its courſes both rightly inſtituted, and alſo wrongfully and evilly conſtrained; now it behoves us next to declare, how far Art (for the moſt part the Ape of Nature, and ſometimes Miſtris or Moderatrix thereof,) can act likewiſe well, or better about letting of blood, and how ſometimes it is wont to ſucceed worſe.

Emiſſion of the Blood procured by art.

We advertiſe of theſe things in general, that a Phyſitian imitates Nature in ſome caſes of letting blood, exceeds her in other caſes, and frequently regulates and reduces her when acting amiſs. Moreover, there are ſome caſes wherein Nature excells far the efficacy of Art concerning bloody excretions; briefly of each of theſe.

1. It either imitates Nature.

Therefore in the firſt place, in whatever affects, ſpontaneous Hæmorrhagies are wont to bring help, when theſe are wanting, Phyſick the Handmaid of Nature rightly ſubſtitutes Phlebotomie. Therefore, if perchance the Blood be immoderately kindled by reaſon of its Sulphur being too much looſened and advanc'd, by breathing a vein, what is ſuperfluous of that inflammable fuel will flow out, as alſo the immoderate turgeſcency of Blood, by reaſon of ſomewhat untamable being mixed with it, will be allay'd by this courſe. Wherefore letting of blood is advantageouſly adminiſtred, as well againſt continual Feavers, which proceed from the former cauſe, as intermittent Feavers, whoſe fits proceed from the latter cauſe. Alſo in like manner, as often as an accuſtomed evacuation being ſuppreſſed, or a humour driven back from the ourward parts, or a ſudden ſtoppage of the pores, or if a Surfeit, drinking of Wine, or other accidents of this nature, cauſe a turgeſcency of blood (inaſmuch as they daſh heterogeneous particles againſt it) Phlebotomie is uſually the moſt ready Remedy.

2. Or excells and regulates it.

Secondly, Phyſick in Blood-letting, not only imitates Nature, but often excells it; and alſo ſuccours her being weakened, and reduces her often erring. For if at any time the blood ſtruck with violence, ruſhes in a heap againſt any part, and either preſently breaks out in the ſame place, or abundantly gathered together engenders an Inflammation, a vein being pierced in a remote place, ſtops that preternatural tendency of the blood, and frequently carryes away the bleeding, or inflammation. Wherefore, in a Pleuriſie, a Squinancy, a Peripneumonia, in ſpitting or vomiting of blood, when Nature is vanquiſhed, or being outragious, ſeems to caſt violent hands upon her ſelf, Chirurgery recalling the blood to another part, and ſending it out, reſtores the matter that was almoſt deſperate.

Moreover Phyſick frequently reſtrains or reduces Nature, when too prodigal or prevaricating in pouring out of the blood: for in truth all immoderate Hæmorrhagies do want Bridles, not Spurs. But in the Plague, Small-pox and Meaſles broke out, and in malignant Feavers, ſometimes the blood ſpontaneouſly flowing out, portends for the moſt part evil; therefore in thoſe affects ſtyptic Remedies, or things ſtopping the eruption of blood, are more convenient than breathing of a Vein.

3. Or Art outdone by Nature.

Thirdly, Notwithſtanding on the contrary there are caſes of ſhedding blood by Nature, which Phyſick can no way imitate, neither if they chance to fail, can be ſupplyed by Phlebotomy. In Feavers about the Criſis of the Diſeaſe, to wit, after the digeſtion of the matter, that is to ſay, the preparation for Excretion, ſpontaneous Hæmorrhagies if coming in time, do far excell any Phlebotomie which none knows the beſt ſeaſon of; Moreover, the Fluxes of the Terms and Hæmorrhoids happening by Natures inſtinct, are more advantageous than the miſſion of blood provok'd by Art in any of thoſe places.

Phlebotomy and ſpontaneous Hemorrhagies differ as to the ſubject and matter.

Between Phlebotomie and ſpontaneous Hæmorrhagies, there is yet a notable difference, (although not of great moment in Phyſical practice) *viz.* both as to the Subject and Matter of either of them; for in this the blood being florid, and throughly Scarlet, doth for the moſt part only flow out of the Arteries, but in the other Evacuation the Blood being of a black purple with a Scarlet Cream, is only drawn out of the vein.

vein. Whence the ſtream of Blood, which is one within all the veſſels and throughout continuous, acquires ſuch a diverſe kind of appearance, ſeeing we have ſhewed in another place, it is not our preſent purpoſe to make any further ſearch into this Ætiologie; becauſe it concerns not much to the curing any diſtemper, out of what veſſel the blood be let, provided it flow out largely: But that the ancients do in ſome caſes commend Arteriotomie, and prefer it to an inciſion of a vein, the Circulation of Blood not being then known, we have elſewhere diſcourſed how well it may be done.

The uſe and effects of Phlebotomy.

Hitherto of Phlebotomie compared with a ſpontaneous Hæmorrhage; now our next buſineſs is, to deſcribe the uſe and effects thereof, as well good as bad, in Phyſical practice. Wherefore we will firſt ſhew in general what alteration of the maſs of Blood this Evacuation brings; then what diſeaſes it more immediately reſpects, either of the whole body, or its particular parts.

How it affects and alters the Blood.

About the former, it is obvious enough that the blood is altered by breathing a vein, both as to its quantity and temperament, and as to its diſpoſition and motion.

1. Diminiſhes its quantity.

The firſt and moſt common Indication of Phlebotomie, is, that the plenty of blood be diminiſhed by this Adminiſtration. And truly this is a vulgar Remedy, to remove or provide againſt a Plethora. Any one, though of the vulgar ſort, growing to a full habit of body, lets blood without the advice of a Phyſitian; Moreover Ruſticks and Countrey-men for healths ſake, once or twice in a year cauſe blood to be drawn from themſelves and their Beaſts. But although this cuſtom is grown ſo much in uſe with ſome prodigal of their blood, that they breathe a Vein on the ſmalleſt occaſion, and ſometimes without any manifeſt cauſe; notwithſtanding we may find many others no leſs obſtinate againſt this cuſtome, inſomuch that for no cauſe will they loſe any blood, unleſs the greateſt neceſſities be urgent.

Emiſſion of the Blood is not to be either too prodigally, or too ſlenderly made.

The reaſons of the former hinted at.

Upon this matter (whereas Arguments are alleadged on either part,) that I may in few words determine what ſeems fit to be ordained, in the firſt place it is requiſite we grant, that letting blood is convenient againſt a Plethora either made, or beginning: for by no other Remedy are the evils of that Affection wont to be better removed or provided againſt. Notwithſtanding, the neceſſity of this evacuation ought to be declined as much as may be; becauſe from thence (as we have intimated elſewhere) the blood becomes more ſulphureous, and leſs ſalt, and for that reaſon it moſt commonly diſpoſes all men to be feaveriſh and to be fat. Moreover the Great Remedy Blood-letting, if it be proſtituted to every little occaſion, becomes leſs efficacious to any grand affections when need requires: To which we may adde, that according to the vulgar obſervation, by how much the more familiarly any one uſes Phlebotomy, he will the more frequently ſtand in need of it: for blood being emitted to avoid a Plethora, the reſt of the maſs will the ſooner riſe to a Plethora: far otherwiſe than is the opinion of ſome, who dread leſt the ſtore of blood be conſumed by frequent Phlebotomie; for that on the contrary by this means the quantity is more encreaſed, although the Craſis be the worſer: for ſo the blood having loſt much of its balſamick Salt, and preſervative againſt putrefaction, inſtead thereof, is filled with a pinguifying and more fiery Sulphur.

2. Phlebotomie amends the mixture of the Blood.

Secondly, Phlebotomie doth frequently correct the mixture and temperament of the blood in a manifold reſpect. For in the firſt place, if any thing heterogeneous be confounded with its maſs, which cannot be rightly digeſted, nor eaſily excerned and ſent away: a Vein being opened, the blood flowing out conveyes frequently much of the portion of that matter forth with it, inſomuch that the reſt may be either ſubdued or expell'd. For the orifice of a veſſel being opened, preſently the blood fermenting gathers together the extraneous particles as much as poſſible, and excludes that portion of it ſelf wherein many of them are heaped up: From hence we may obſerve the blood flowing out firſt and laſt to be well enough, when that emitted between appears corrupt. Alſo ſecondly, the blood declining from its temperament, is frequently reſtored by Phlebotomie. For when the maſs thereof by the Sulphur or fixt Salt, or both together being exalted, ſhall degenerate into ſharp, ſalt, or ſaline-ſulphureouſneſs, a portion of the blood being withdrawn, immediately a new fermentation thereof ariſes, and very often there is a tranſpoſition made of all the particles of that ſort, that afterwards the Spirits may a little emerge with the volatile Salt, and recover their dominion, the Sulphur, and fixt Salt (as is fitting) being ſubdued. For this reaſon it is that letting Blood doth not only confer great

It reſtores its temper.

help in Feavers, but alſo in the Scurvy, Jaundies, and beginning Conſumption; for the blood after the veſſels are emptyed, like the Stomach disburden'd, doth better digeſt and aſſimilate any humours ingeſted, and the more eaſily throws off and ſeparates whatever is heterogeneous.

Some diſtempers of the blood admit not Phlebotomy.

But if the mixture of Blood begins to be much looſned and become very bad, as in the Plague and malignant Feavers, we muſt altogether abſtain from Phlebotomie; for the blood being withdrawn, the ſtore of Spirits (whoſe only part it is to vindicate the maſs of blood from putrefaction and corruption) is diminiſhed, ſo that immediately all things tend to a deadly diſſolution. Moreover, if the Dyſcraſie of the blood ſhall be of that manner, that the more noble Principles, to wit, the Spirit, the volatile Salt and Sulphur, being depreſſed or conſumed, the watery and earthy particles predominate, the blood ought not to be ſent out, but preſerved even as the treaſure of life; for when the abundance of Spirits are ſo ſmall, any loſs of them doth cauſe all the functions to ſtagger, and gives way to the diſeaſe; wherefore in a Dropſie, Cachexia, Conſumption, and other Diſtempers, where the active Principles are greatly depreſſed, the opening a vein is almoſt the ſame thing as cutting the mans throat.

In ſome caſes about Phlebotomy it is very doubtfull.

In the before-mentioned caſes, where the temperament of blood is reſpected, it is eaſie to determine, whether Phlebotomie be convenient or not; but in ſome others, as in a putrid continual feaver, when upon this hinge Life and Death are turned, there is need of the greateſt deliberation: and ſo much the rather becauſe the event of the Diſeaſe, and the ſucceſs of all the accidents in its whole courſe, whether good or bad, is uſually imputed to Blood-letting, or its omiſſion: and from hence it is, that Phyſitians being ſolicitous to preſerve their own repute, do chiefly raiſe doubts in their conſultations of this matter. But truly in this difficult knot that we may not be led by the rumour of the vulgar (as it chances to happen) one while approving, another while condemning Phlebotomie, but with more certain advice: we muſt conſider the ſtate of the Blood, the tendency of the morbific matter, and the ſtrength of Nature. Firſt as to the former, if in a putrid Feaver, the blood very much growing hot ſhall raiſe a great heat, with thirſt, watchings, and burning of the Jaws, and no eruption of abundant ſweat, nor puſhes appear, or is ſuddenly expected, opening of a vein is ſo clearly demonſtrated, that it is a wickedneſs to omit it; but on the contrary if in a languid body, a flow and remiſs Feaver, but continual, ariſes, with a weak Pulſe, let Blood-letting be ſpared, and the cleanſing thereof be procured by breathing Sweats, Urine, and bliſtering. Notwithſtanding, in a middle ſtate of Blood, and of a Feaver, Phlebotomy almoſt indifferent in it ſelf, is determined by other things. Therefore ſecondly we muſt weigh the tendency or flux of the morbific matter, which if it remain dull in the maſs of blood, and unfit to be ſeparated, and ſo (as it is frequently wont to be) inſtead of a Criſis, a tranſlation towards the head be made, and threaten the brain and nervous ſtock, the cutting of a vein ought ſeaſonably to be adminiſtred, whereby theſe evils may be provided againſt. Notwithſtanding, if that this matter being ſoon raiſed into a rage, and either ruſhing inwardly to the bowels of the nether Belly, provokes a huge Vomiting, or Dyſenterical affections, or being driven outwardly, ſeems to be about to bring the Small-pox, Meaſles, and other puſhes, every ſuch force of Nature, if good, ought not to be diſturbed, if evil, not to be made worſe by Phlebotomie; for in theſe caſes it is not only dangerous to let blood, but alſo very ſcandalous. Thirdly, about Phlebotomy to be adminiſtred in a doubtful caſe, we are to take heed to the ſtrength of the Patient; for in a healthful Conſtitution, a vigorous Age, the commencing of a Diſeaſe, and the functions both vital and animal being yet in a florid or indifferent eſtate, we may confidently preſcribe letting of blood, unleſs ſomething indicates the contrary. Notwithſtanding, when it is otherwiſe, as to thoſe conditions, we may not raſhly proceed to that Evacuation.

And chiefly in a continual putrid Feaver.

How the doubt is to be determined.

Thirdly, Phlebotomy corrects or ſtays the inordinate motions of the Blood.

Thirdly, the inordinate motions of the Blood, when being very much moved, as it were with fury, it either ruſhes impetuouſly one while into theſe parts, another while into thoſe, or transferres the noxious matter, are beſt reſtrained or reduced by Phlebotomy; wherefore in great Cephalalgies, in all ſoporiferous or convulſive invaſions, for Catarrhs, Ophthalmia's, and a Cough, Aſthma, fits of the Gout, and Stone, or Phlegmons, Eryſipelas's, alſo for many other Diſtempers, raiſed by the flowings of the Blood or Serum, an inciſion of the vein is commonly preſcribed, and indeed for the moſt part as with good ſucceſs, ſo alſo upon right Reaſon; for the Veſſels being emptyed,

emptyed, the blood having obtained a more free ſpace, is circulated pleaſantly and undiſturbedly, beſides, whatever is extravaſated of the Blood or Serum, is wont to be ſuckt up again and reduced into its courſe.

What Diſeaſes, and of what parts Blood-letting chiefly reſpects.

The Effects as well good as bad being thus ſhewn, which happen to the blood in the manifold ſtate thereof, by Phlebotomie, we will next make ſtrict examination what Diſeaſes chiefly, either of the whole body, or of any private Region that kind of Remedy doth more immediately regard. And firſt as to what relates to general Diſtempers, it is commonly enough known, that letting blood is indicated by a hot and dry temperament, and interdicted by a moiſt and cold. It is uſually propounded in every Feaver, but never in a Dropſie. Moreover, if we conſider particular Diſeaſes, there is no region or part of the Body, but as they rejoyce in the influence of vital as well as nutritious blood (as long as it is well) ſo as often as it is diſturbed in any place, or reaches out any diſagreeable or provocative thing, in place of benign Juice, it requires avocation and a letting out thereof. If I ſhould take notice of every ſingle caſe of this Indication, we ſhould here rehearſe almoſt the whole Pathologie of the humane body. An aking Head, a Brain oppreſs'd with blood, or overflowed with Serum (whence ſpring a world of evils) burning of the eyes, inflammation of the face, mouth and throat, all the diſeaſes of the Breaſt and Præcordia (inaſmuch as the diſorder of Blood affords a riſe or fuel to each of theſe) likewiſe obſtructions or inflammatory affections of the Liver, Spleen, and other Bowels; moreover, as a Plethora, and Athletick habit of the whole body, ſo alſo the tumours of each member, painful and convulſive paſſions, ſeem to accuſe the blood as Author of all the evil, and require its ſending out, as a certain kind of revenge.

After Phlebotomy being indicated theſe four things following ought to be conſidered.

In theſe and very many other diſtempers, if at any time Bleeding be clearly indicated, before it be performed four things ought to be conſidered, *viz.* In what place, by what manner and inſtrument, at what ſeaſon, and in what quantity the Blood ought to be taken away.

Firſt the place from whence Blood is to be taken.

Firſt, as to the former, although according to the Laws of the Circulation of the Blood, as oft as the maſs ſhould be diminiſhed, it differs little from what veſſel a part thereof be taken, provided it be large enough; notwithſtanding, for that beſides a general evacuation of the blood, ſometimes a particular one properly called Derivation (as when the blood is to be brought out of a private place where it is accumulated) and moreover a Revulſion, when it is to be called into this or that part, are intended; for that reaſon, in a humane Body there are appointed as it were various Boundaries, out of which, now by this, now by that, or by another vein, the blood may be emitted as occaſion is given, and for the uſes chiefly requiſite.

In ſome caſes from the Arm.

If therefore at any time an univerſal Evacuation of the blood be indicated, the median vein of the Arm is beſt to be opened, for this is eaſily opened being large enough, and whereas it equally flows from the whole body to the orifice thereof being open enough, by whoſe more free efflux not only a Plethora is taken away, but the greater veſſels being every where emptyed after this manner, the blood ſtagnating in any place, is brought into motion, and being extravaſated is again ſwallowed up into the veins; wherefore, in great diſtempers when the blood being heaped in the Brain, or Præcordia, does threaten ſudden deſtruction, the beſt way not only of general Evacuation, but of a Revulſion, is to ſend the blood by a full current out of the vein of the Arm, being largely open'd.

In others from the vein of the Forehead, Temples or Throat.

But if without any great Plethora the blood ought to be evacuated from the whole, and pulled back from the upper part of the body towards the inferiour, as in the ſuppreſſion of the menſtrual flux or Hemorrhoids, it will be rather fit to bleed in the Foot or ſedentary veſſels by Leeches. But if after the blood being evacuated from the whole, it be alſo to be derived from any private part where it is accumulated, let its drawing off be near the place affected. Hence in Cephalick Diſeaſes, we open the vein of the Forehead, of the Temples, or of the Throat. To cure Tumours, or pains raiſed in the Joynts, we cut a veſſel either beneath or near them, or draw out the blood by Cupping-glaſſes or Leeches. In like manner in diſtempers of the Thorax and nether Belly, either Cupping-glaſſes are applyed to the region ſuffering, or Leeches to the ſedentary veſſels.

The Cephalic Vein of the Arm, the Liver Vein, or the Salvatella erroneouſly ſo called.

But that ſome Veſſels are reported to bear a peculiar reſpect to certain Bowels, and that they ought to be lanced in their diſtempers; *viz.* ſuch are the outward brachial vein, which is ſaid to reſpect the head, and the inward the Liver, alſo the outer vein of the Hand tending to the Ring-finger, which is ſaid to reſpect the Spleen, and for

that cauſe this is called the Salvatella, and the former of them the Cephalick, and the other the Jecorary; all this is meerly a vulgar error, which being propt by no reaſon or Anatomical obſervation, I am ignorant whence it took its origine: Therefore as ſoon as it is agreed on to cut a vein and its place, let a large Veſſel be choſen, and very conſpicuous, that it may the more eaſily be opened; and being remote from an Arterie, Nerve, and Tendon, may be the more ſecurely lanced; wherefore in the Arm the median vein is commonly choſen, although the Cephalick being leſs environed with other Veſſels, is the more ſafely opened.

The jugular Vein is moſt ſafely opened.

The Jugular Vein is almoſt always opened as often as blood is let in Beaſts, it is a wonder it hath not obtained the ſame Cuſtom in Man, when the large and eminent Pipe hereof may moſt eaſily and ſafely here be cut, becauſe it neither hath an Arterie for its companion, and lies a great way from any Nerve. Moreover, from this veſſel as from any other whatſoever opened, an univerſal evacuation of blood is made from the whole body, and together the beſt derivation thereof from the head, ſo that all the ſtagnations or aggeſtions of the Blood and Serum are diſcharged thence.

Of Veins in the hand or feet.

Concerning Veſſels in the foot or the hand there is no great reaſon of choice, but take the vein which chiefly ſwells: it matters little concerning the Place, unleſs that if inciſion be made above, or near the Ankle, there is great care to be taken leſt a Tendon be hurt, which ſometimes by unskilful or raſh Chirurgeons happens to the damage of the Patient. Moreover, let care be taken leſt a vein be cut near its Anaſtomoſis with an Artery, for if this be committed, the blood being entirely Scarlet, will impetuouſly skip out, and the flux thereof is not eaſily ſtayed, nor the orifice of the veſſel ſoon ſtopt.

We ought to conſider by what means or by what inſtrument the Blood ought to be drawn forth.

The chief places being thus deſigned of letting forth the blood, and the choice of the veſſels being ſhewed, we ought next to treat of the Manner or Inſtruments by which blood is drawn out; which is uſed to be done either by a Lancet, in cutting the vein, or by ſuction by Leeches, or by Cupping-glaſſes after Scarification. But there is no need of diſcourſing theſe, becauſe each of theſe parts of Chirurgerie are every where in familiar uſe by Quacks, Barbers and Women, and all things relating to them ſo commonly known, as a man his own houſe; wherefore we will ſpeak but one word.

Some of the Ancients as well as Modern have ridiculouſly exclaimed againſt letting of Blood.

Helmont of late, and ſtill certain followers of him, Pſeudochymiſts and Fanaticks, have ejected Bleeding out of all Phyſick, becauſe they think this evacuation to be a great injury to Nature, (which being aided either by her own ſtrength, or by their Panacea's, they will have to overcome every offenſive thing of her ſelf;) Surely, this is no leſs ridiculous a thing than that long ſince *Chryſippus*, *Apæmantes*, *Strato*, and ſome others, (as *Galen* reports) damn'd this remedy, becauſe a vein is difficultly known from an Artery. Truly it is manifeſt enough by ſad experience, that in cutting a vein ſometimes an Artery hath been pierced; whence either death or loſs of the member ſometimes enſues: the reaſon whereof is, not as is commonly alleadged, that the coats of an Artery being more nervous or membranous than the coats of a Vein, can ſcarcely or not at all be healed; when in truth that Veſſel is endowed with more and thicker fleſhy fibres; but the cauſe is, that an Artery like the Heart it ſelf, ought inceſſantly to ſhake and beat, the fibres thereof repeating perpetual turns of Syſtole and Diaſtole; wherefore, a little hole being made in its Pipe for the moſt part remains uncurable by reaſon of the continual motion of the Veſſel, and the efflux of blood. It is otherwiſe in a Vein whoſe opening is immediately ſtopt of its own accord; for but little of contractive work lies in its Coats, yea this only, that its fibres being lightly opened as occaſion ſerves, the blood flowing back of its own accord, is gently moved forwards; and after Phlebotomy, the veſſel being empty, they are permitted to be quiet, ſo that in the mean time the little hole made by inciſion is eaſily glewed together. Whenever Phyſitian or Patient do dread the opening of a vein to be adminiſtred, drawing of blood by Leeches or Cupping-glaſſes, will aptly enough and with like advantage ſupply the defect hereof. Moreover theſe adminiſtrations to remove the conjunct cauſe of a diſeaſe, where there is need rather of partial than general Evacuation or Derivation, are frequently preferr'd to Blood-letting it ſelf. There is no need to dwell longer on explicating the manner and reaſon of the effects of either of theſe operations, commonly enough known, but proceeding to other things, we will next throughly weigh the Time and Quantity of letting Blood.

Wherefore in opening a Vein the pricking of an Artery is ſo dangerous.

The

The opportunity of letting blood is often of ſo great moment, that whereas this Evacuation ſucceeds well at one time, at another it highly prejudices: But there are diverſe reſpects of time to be conſidered about the due performance of Blood-letting, but chiefly theſe four: The Time of the Diſeaſe, the Age, the Year, and Day: The firſt concerns chiefly the Cure of the Patient, the others the Preſervation of him.

Thirdly, The Time of letting Blood comes into conſideration.

Firſt therefore if blood ought to be let in any Diſeaſe, it will be chiefly ſeaſonable about the beginning or encreaſe thereof, but not at all or very cautiouſly in the ſtate or declination. For at that time whilſt Nature is buſied, endeavouring a Criſis, ſo that the Spirits are in great labour, and the blood ferments very much, that great endeavour of it ought not to be diſturbed; and in the height of the diſeaſe, either Nature being Conquereſs doth not want ſuch a relief, or being ſubdued will not endure ſuch an Evacuation.

1. *In reſpect of the diſeaſe.*

Secondly, If at any time for preſervation it be deliberated touching letting blood, Infants, Boys, and Old men, by the Cuſtom of all Nations obtain an exemption; alſo this evacuation was wont to be interdicted to pregnant Women, but now moſt commonly preſcribed. Men of a vigorous Conſtitution and middle Age, do well enough endure Phlebotomy, and often times want it. Notwithſtanding the firſt and ſecond time it ought not to be done without great occaſion, for that being once begun and afterwards repeated, it will ſoon proceed into an inevitable Cuſtom.

2. *In reſpect of age.*

Thirdly, Hence they who uſed to let blood Spring and Autumn, afterwards cannot omit this evacuation without hazard. But to whom it will be either profitable or neceſſary to breath a Vein once or twice a year, the chief ſeaſonable times will be in the beginning of Spring and Autumn, *viz.* when the Blood being prone to ferment anew, is in danger to change its Craſis. Phlebotomy ſeaſonably adminiſtred, provides leſt the Sulphur and Salts being exalted, it ſhould contract a feaveriſh, ſcorbutical or other peccant diſtemper; likewiſe, leſt ſuffering a flux, it ſhould pour forth the ſerous Recrements, and other Feculencies upon the Brain, the Lungs or Bowels of the nether belly. About the Solſtices, when our bodies are very cold, or hot, the blood, as the juice of all Vegetables, conſiſting in a more fixt ſtate, and unapt to ſwell up, ought not to be let out, unleſs upon ſome urgent cauſe.

3. *In reſpect of the Year and its parts.*

But whereas ſome preciſely, or rather ridiculouſly, obſerve about Phlebotomy, (even as the Countrey-men about Gelding Cattle,) the poſition of the Heavens, and the Aſpects of Moon and Stars, it appears altogether frivolous; and for that chiefly is this Cuſtom condemned, inaſmuch as counterfeit Aſtrologers have a Figure in their Almanacks wherein every ſign of the Zodiack, is allotted to every particular member of our bodies; and for that cauſe, under what ſign the Moon is converſant, they forbid blood to be drawn from the reſpective part of man. They who obſerve without reaſon the Heavens, do erre (as the ſaying is) the whole compaſs of the Heavens. Moreover, this vulgar error is not only abſurd, but frequently malevolent, inaſmuch as many of the common people will abſtain from Phlebotomy whatever indication makes for the ſame, if (as they ſay) the Sign be in the place of letting blood.

The Aſpect of the Moon and Stars are here of no moment.

Fourthly, As to what relates to the time of the Day, in acute Diſeaſes, when a Phyſitian is ſent for, and there be indication for Phlebotomy immediately to be performed, after the body is prepared, he may preſcribe that operation any hour in day or night; but otherwiſe, if any interval may be allowed, then breathing a Vein rather is to be celebrated in a morning when the Stomach is faſting, the veſſels emptyed by ſweat in the night, the ſtream of blood being quieteſt, and appearing free from any ſerous filth. Yea although neceſſity urge, it may be deferr'd a little untill the new Juice of things eaten be paſs'd into the blood; for the veſſels being emptyed will not only ſnatch the crude Chyle into themſelves, but frequently what is diſagreeable or unproportionate unto the blood, whence not only its motion is diſordered, but alſo the vital flame runs the hazard of being extinct. I have known ſome by Phlebotomy adminiſtred preſently after plentiful Drinking, or pouring in of vinous liquors, to have fallen into dreadfull ſwoundings away, which have laſted very long, untill the vital ſpirit being almoſt overwhelmed recovered it ſelf again.

4. *The time of the day about letting of Blood.*

Moreover, in the fifth place, the opening the vein being indicated, and its time appointed, there remains ſtill no little conſideration to be had, what Quantity of blood is to be let out, in which point there is moſt commonly a fault committed, while ſome being too audacious, and others no leſs timerous, they affix thoſe bounds on this or that ſide of which for the moſt part conſiſts the Right. For that I may omit

5. *The Quantity of the Blood to be taken away ought to be conſidered.*

Too much Phlebotomy to be avoided.

omit thoſe who ſcarcely or not at all admit of Phlebotomy (as I have before hinted) ſo I cannot eaſily aſſent to their practice who fear not to draw blood to ſwounings: Beſides, an error of no light moment is committed within the moderate bounds, while in ſome caſes blood is drawn by too ſparing a hand, and in others with too free. In a burning Feaver, Pleuriſie, Peripneumonia, Squinancy, Frenzie, Apoplexie, and other great diſeaſes, that have their origine from a turgeſcency or phlegmonic incurſion of the blood, a ſparing Phlebotomy doth always more prejudice than advantage. For beſides that it doth not remove the antecedent cauſe of the diſeaſe, to wit, the Plethora, it further cauſes the conjunct cauſe, *viz.* the inflammation and burſting out of the blood to be augmented. For truly it is a conſtant obſervation, that upon blood too ſparingly drawn, the whole maſs doth boyl up more notably, and doth acquire a new flux into the part affected; the reaſon of which is, that in a great Plethora many portions both of the Blood and Serum being thruſt forward into receſſes and ſtrait places, are there conſtrained to abide; which, after the Veſſels being a very little emptyed, do impetuouſly regurgitate into the maſs of blood, and do much diſturb it, and force it more impetuouſly to and fro. Wherefore alſo in this reſpect the veſſels ought to be very much emptyed, *viz.* that beſides freeing the former Juice from ſtraitneſs, alſo ſpace may be given to the Juice reduced from exile, which otherwiſe being not congruous, coming upon the blood, troubles it, and provokes it into effervescencies and eruptions. From hence we may obſerve, that almoſt all men grow more hot preſently after Phlebotomy, and yet the blood being ſufficiently evacuated, a little after they enjoy a more temperate condition.

But a more ſpare Bleeding often hurts, and fixes a feavour.

The Reaſon of which is declared.

But as a ſlender withdrawing of blood in ſome caſes is not only vain, but is performed with prejudice, ſo in other caſes too much effuſion is rarely committed ſcot-free, and ſometimes brings notable detriment of health. For when either ſtrength languiſhes, or the body labours under a notorious Cachexia, we muſt ſpare Blood-letting, and its taking away is either prohibited, or being indicated by ſome accident, is allowed but in a ſmall quantity. Wherefore in men endowed with a weak, tender and cold Conſtitution, and in conſumptive perſons, thoſe affected with a long or malignant Feaver, alſo in Hydropicks or Cacochymicks a vein is not raſhly to be breathed, at leaſt if it be, much blood is not ſuffered to be taken away. It will be an impoſſible thing to preſcribe general Rules, according to the particular caſes of every individual perſon, whereby the quantity of letting Blood may be exactly proportion'd according to the ſtrength of the Diſeaſe and the ability of the Patient; but let this be left to the judgment of the prudent Phyſitian preſent, and let his Commands be ever exactly obſerved; And let not (as it every where is) ſuch leave be given to Quacks, Empiricks and Barbers to play with humane life, who every where raſhly and wickedly uſe Phlebotomy; and if the blood ſpring more freely and appear diſcolour'd, therefore bragging of the veſſel being well pierc'd, they ſay it muſt be let out more plentifully, becauſe it appears bad, when oftentimes on the contrary it ought to be ſpared.

In ſome caſes the miſſion of Blood muſt be altogether avoided.

Phlebotomy ought ever to be done with a large orifice.

As ſoon as the Quantity of Blood to be taken away is determined, our next care ought to be, that a more large orifice being made, the blood equally mixt may flow out as ſoon as may be; for otherwiſe, if it go out from a ſmall hole, or drop by drop, or with a little ſtream, the maſs of blood fermenting will ſeparate into parts, and what is more ſubtile and ſpirituous will burſt out, the thicker and feculent remaining behind. Hence it is to be obſerved, that the blood being let out of a large orifice with a more full ſtream, if it be a little ſtopt with the finger clapt on it, and a little after ſuffered to flow out, the blood going out the ſecond time becomes much purer and brighter than the former, becauſe in the interval of flowing, the more ſubtile particles being unfolded from the thicker, and accumulated together, have prepared themſelves to fly away. Wherefore, if *Hippocrates*'s Precept ſhall be obſerved, *viz.* to let it run to the change of its Colour, it behoves us to procure that it ſpring out quickly, with a full and not interrupted ſtream. Beſides all this, as to what appertains to the alteration of the blood let out, and cold, and to the inſpection and the judgment thereof, for that we have often diſcourſed it in other places, we now paſs it by, haſtening to other things; and now the thread of Method leads us to entreat of Remedies oppoſite to Blood-letting, to wit *Iſchæmones*, that is, thoſe which are convenient to ſtop immoderate Hæmorrhagies, whether engenderd by Nature or by accident.

SECT.

SECT. III. CHAP. II.

Of Remedies reſtraining or ſtopping of Blood.

Every Hemorrhage is not to be ſtopt.

EVen as Art imitates Nature in letting forth the blood by Phlebotomy offending in plenty, or temperament, or in its motion, ſo it ſuccours her being diſeaſed or working wrong, by ſtopping the flux of blood whenſoever it is immoderate or hurtfull. Whereas there are various and many ſpecies of an Hemorrhage, there is no need of Phyſick for them all. If perhaps a great effuſion of blood happens by a ſolution of unity, excited by an outward accident, as a wound, or ſtroke, Chirurgery ſuggeſts the manner of Adminiſtrations whereby it ſhould be reſtrained. Moreover, an Hemorrhage as long as it ſhall be Critical, ought to be diſturbed by no Medicine, but left to the meer government of Nature (as long as ſhe does aright uſe her power;) and as to the Symptomatic, whileſt it is little or not much troubleſome, there is required no Phyſick: notwithſtanding there is great need of it, if at any time the Flux of blood be either immoderate, or flow out by unapt places.

But only the immoderate and inconvenient.

Eruptions of blood of this laſt kind chiefly challenge a Cure, if perhaps the blood be caſt upward by Coughing or Vomit, or downwards by ſeige, or thrown off through the Ureters. For in theſe caſes, though the quantity of the Blood excreted, be not much to be dreaded, notwithſtanding becauſe often a dangerous or mortal Ulcer enſues the ſolution of the Unity ſo made in the Lungs, or in the Stomach, Guts, or in a Vein; therefore we muſt induſtriouſly rancounter thoſe Hemorrhagies from their firſt appearance. Therefore among the Diſeaſes of thoſe parts, ſuch bloody excretions are accounted; but we have already in another place delivered the Theories of Spitting Blood, and of the affection Dyſenterical, and the reaſons of healing them, ſo that there is no need to repeat them here; neither alſo to propound here a remedy for bloody Urine, for that it belongs to the Nephritic Pathology; wherefore we will paſs to thoſe Paſſions, for which by reaſon of an immoderate efflux of blood, there is great need of reſtraining Medicines.

The chief Caſes of the latter are reckoned.

And alſo of the former.

The kinds of theſe Affections are chiefly three, *viz.* Hæmorrhage of the Noſtrils, of the Flowers, and the immoderate Flux of the Hemorrhoids: The Cure of which laſt doth belong more to Chirurgery than Phyſick, and I think it beſt to referre the other to the hyſterical Pathologie. Here properly belongs to this place the blood flowing out of the Noſtrils, being the moſt general kind of paſſions of that ſort, and common to every Age, Sex and Temperament, ſo that from the Diagnoſtick and Therapeutick of it duely aſſign'd, the uſes and efficacies of Medicines ſtopping blood will beſt appear: for what we proffer for the unfolding the Cauſes and Cure of this bloody eruption, may be accommodated unto all other dreadful Hemorrhagies.

For the preſent the Cure of the Hemorrhage of the Noſtrils is only propounded.

It is obſervable enough, that the Flux of blood from the Noſtrils doth happen to moſt men from extraordinary occaſions; for as oft as the blood, about to break out through its own turgeſcency, or through laxity of the veſſels, is apt in ſome place to make or find its way, it is, by a certain inſtinct of Nature, very often directed to the Noſtrils, as to the part moſt eaſily opened. The veſſels from whence it flows in that place, are ſlips of the arterial Branch going from the Carotides, after having paſs'd the Cranium, it comes to the baſis of the Cerebrum; for this proceeding near to the mammillary Proceſſes, ſends very many twigs from it ſelf every where about, of which ſome eminent ones paſſing the hole of the Sieve-like Bone with the ſmelling Nerves, are diſtributed through the glandulous membrane, inveſting the windings of the top of the Noſe. Theſe naſal Arteries departing firſt from the Trunk of the Carotides within the skull, anticipate part of the blood chiefly ſerous from the brain, and lay aſide the Serum it ſelf and other watery recrements into the glandules of the Noſtrils, as into the proper Emunctories of that Region, whence they diſtill into the cavity thereof. Wherefore, if the mouths of thoſe little Arteries do alwayes gape ſomewhat by reaſon of the ſweating out of the Serum, it is no marvel if the blood it ſelf being made more turgid, opening them a little more (which often are too looſe of themſelves) burſts forth of dores. Indeed this Emiſſary both of the Serum and of the Blood, being apt ordinarily to open, or on any occaſion, prevents

A deſcription of the Veſſels from which Blood flowes.

prevents or cures great incommodities of the brain, or of the Præcordia, yea and ſometimes of the whole body.

They are the ſame by which the Serum diſtills to the Noſtrils.

For in the firſt place, this way the Serum (as I ſaid) is derived from the head, and when the mouths of thoſe Veſſels are vellicated or provoked by any ſneezing Medicine put into the Noſtrils, the Serum is from thence more abundantly drawn out; which yet doth not deſcend from the Brain (as is commonly thought) but is anticipated by theſe naſal arteries, leſt it ſhould go to it; from which when it is more plentifully drained and brought forth by the uſe of Errhines, for that cauſe the Brain becomes more ſerene and exempt from vapours. Then ſecondly, leſt the Brain ſhould be overwhelmed at any time by blood more impetuouſly overflowing, a portion hereof paſſing through theſe veſſels and breaking out, eaſily prevents it.

The Blood flowing forth in too great plenty from theſe Veſſels, is very hurtfull.

But ſometimes it happens that an Hæmorrhage of this kind, rather becomes a Diſeaſe than a Remedy; for whenſoever the blood flows out more often and more abundantly than is fit from the Noſtril, if life be not immediately hazarded by reaſon of too great loſs, yet the remaining maſs of the blood being impoveriſhed thereby, and loſing its temper, acquires a cachectick and frequently an hydropick diſpoſition; even as we have clearly intimated before, where we alſo have ſhewn the Ætiologie of this diſtemper in common with other too great Hemorrhagies, either to conſiſt in the fault of the blood, or of the veſſels, or of both together.

The cauſes of ſuch an immoderate flux.

Firſt, the blood bringing an Hemorrhage of it ſelf, offends either in Quantity or Quality; and therefore while occaſionally it boyls up, it cannot be contained within the veſſels, but either opening their mouths by diſtending them, or unlocking them by its acrimony, it skips out: To which happens that the blood being ſometimes diſſolved in its conſiſtence, and as it were infected, becomes unfit to continue the courſe of Circulation, inaſmuch as portions thereof ſeparating from one another, are partly fixed in the fleſh or skin, having ſuffer'd death; and partly breaking out, ſtirre up frequently dreadful, and ſometimes mortal Hæmorrhagies, as every where is diſcovered in malignant Feavers, and ſometimes in the Scurvy. Notwithſtanding the blood offending by meer Quantity or Acrimony, unleſs the fault of the Veſſels happening thereon provoke the flux thereof, or too eaſily permit it, ſeldom breaks out into a great Hemorrhage.

1. From the fault of the Blood.

Therefore ſecondly, the veſſels bringing blood, as often as they conſpire to produce that affection, are uſually in the fault, either firſt inaſmuch as their ſmall mouths gaping, by reaſon of the fibres being too looſe and weak, do not readily enough tranſvaſate the blood out of the Arteries into the Veins; which fault happens to ſcorbutick and cachectical perſons; or ſecondly inaſmuch as by reaſon of the ſame moving fibres being affected with the Cramp and Convulſion, the blood being ſnatcht impetuouſly to and fro, and chiefly towards the Head, is conſtrained to break out to continue the thread of circulation, even as it will plainly appear in the caſe of a Patient which ſhall be ſhewn below.

2. From the fault of the Veſſels.

Prognoſticks.

1. As to the Prognoſticks, although an immoderate flux of Blood, in the Small-Pox, Meaſles, malignant Feavers, and in the Plague, doth ever preſage evil, and is expedient to be ſtopt; notwithſtanding it ought to be reſtrained not by meer cooling or revulſory things, but to be chang'd by temperate Hydroticks into ſweating.

2. An Hæmorrhage of the Noſtrils, though not great, is more dangerous in Cachecticks with a weak Pulſe, and a cold ſweat, than a plentifull Hemorrhage in men endued with a Pulſe ſtrong enough, and blood very fervent.

3. They who are obnoxious to this Diſeaſe, by reaſon of a Dyſcraſie of blood and looſneſs of the veſſels, if there come upon both theſe a convulſive diſpoſition of the fibres of the little Arteries, they receive a far more difficult Cure, and frequently are reduced to extream languiſhings by reaſon of the great loſſes of blood.

4. From thoſe who are feaveriſh, when much blood ſhall flow out of the Noſtrils, and does not terminate the diſeaſe, often-times in the place of a Criſis a delirous or a ſoporiferous affection ſucceeds. There are many other prognoſticks about a Hemorrhage accurately remarkt by *Hippocrates*, which notwithſtanding properly belonging to the diſcourſe of a Feaver, we omit in this place; for truly, the Cure in general of this Diſtemper is here almoſt only intended.

Three primary Indications of Cure.

About which there will be three primary Indications, to wit, *Curatory*, *Vital*, and *Preſervatory*; the two former reſpect immediately the ſymptom to be ſtopt, as often as it ſhall be urgent; and the laſt is buſie about removing the Cauſe of the Diſeaſe, that

that ſo the aſſaults of the Hemorrhage may be ſmall, or not at all. Beſides, an Hemorrhage ought to be handled one way without a Feaver, and after a different manner if preſſed with a Feaver.

The Curatory Indication ſuggeſts three intentions of healing.

Therefore whenſoever without a feaver much blood ſhall flow out of the Noſe, preſently as there ſhall be need of ſtopping Remedies, there will be three chief intentions of Curing, all being together aſſumed into practice, *viz.* Let the turgeſcency of blood be bridled, that it may be leſs diſpoſed into inordinate tendencies. Moreover in like manner let it be endeavoured, that as well its fluxion being withdrawn from the Noſtrils may be diverted to another place, as that the mouths of the Veſſels gaping within the Noſtrils be ſhut: for which purpoſe Remedies as well external as internal very many and of diverſe kinds are wont to be exhibited; of the former we will entreat in order briefly.

Outward remedies to ſtop the flux of blood.

First therefore let the Patient be quiet, plac'd with his head upright, then let many of the Joints of his Arms and Thighs, but not all, be bound with ſtrait Ligatures, which ought now and then to be looſened and removed to other parts; for all being bound together and long, by reaſon of the blood being held in the outward parts, and too much detained from the heart, hath cauſed moſt dreadful ſwoundings; but otherwiſe this Remedy being prudently adminiſtred, frequently helps. For when the blood by this means running into the members by the Arteries, is ſtopt, that it preſently returns not by the veins, its more impetuous ſpreading it ſelf into the head is impeded. Moreover, by the painfull Ligatures of the Joints, the muſcular Fibres of the Carotides Arteries are preſerved from Cramps which oftentimes come upon them.

1. *Ligatures.*

2. *Bleeding.*

Secondly, For diverting the tendency of blood from the Noſtrils, it is ſometimes expedient to breath a Vein in the Arm or in the Foot. For by how much more blood is carryed by the Arteries to the vein cut, by ſo much leſs will the afflux be towards the Noſtrils. Yet this adminiſtration does not always ſo help, but ſometimes a contrary effect thereof happens, as we have already obſerved in ſpitting blood. The reaſon whereof is, that the veſſels being ſuddenly and not ſufficiently emptyed, ſuck up again the diſagreeable humours formerly ejected, and ſtagnating within the pores, whereby the blood incontinently is ſtirred up into a greater eruptive turgeſcency.

3. *Application of cold things.*

Thirdly, Cold things applyed to the Forehead and Temples, alſo to the Nape of the Neck, where the vertebral Arteries aſcend, cauſe the veſſels to be bound together, and the flux of blood to be ſomewhat ſtopt or repelled. Notwithſtanding it is ill which ſome adviſe, that cooling Topicks be applyed to the Jugular Veins; for ſo the blood being retarded in its recourſe, flows the more plentifully out of the Noſtrils. Moreover, what is uſual, to apply linty Cloaths, or a Spunge moiſtened with Vinegar, to the Pubes and Teſticles, helps by no other means than the ligature of the members, to wit, inaſmuch as the flowing back of the venous Blood is impeded. A ſudden and unexpected ſprinkling of cold water on the face, frequently ſtops an Hæmorrhage, inaſmuch as it gives an impreſſion of terror.

4. *Cupping-glaſſes.*

Fourthly, Cupping-glaſſes applyed upon the Hypochondres, Flanches, inner part of the Thighs, and the ſoles of the feet, are accounted a famous remedy as well with the ancient, as with modern Phyſitians, for diverting a tendency of the blood from the Noſtrils. And the reaſon is plain, *viz.* becauſe a Cupping-glaſs being put on, the impulſe of air being prohibited by the ſpace of the orifice, and encreaſed every where about, preſently the blood and humours, yea and vapours, and ſolid parts, being call'd from any other tendency, are driven towards the empty ſpace of the Glaſs.

5. *Frictions.*

Fifthly, Rubbing of the extream parts are commended in this diſtemper by ſome Practitioners, which we judge not always uſeful, nay ſcarce ſafe; becauſe, although they ſolicit a greater appulſe of the blood to the feet or hands, yet they ſo haſten the return thereof, that the whole maſs of blood being raiſed into an effervescence, it hazards a more violent tendency towards the Noſtrils.

6. *Cauteries.*

Sixthly, *Zacutus Luſitanus* among his revulſory Remedies, propounds an actual Cautery to be applyed to the ſole of either foot; and *Crato* the bending the little finger of the ſame ſide, which becauſe done with no trouble we may try; but we adviſe not ſo of the former, unleſs the way of helping were more certain, which might compenſate the pain and lameneſs that would enſue thereon.

7. *Faintings.*

Seventhly, Swounding raiſed by any means, preſently ſtops an Hæmorrhage, however

ever contumacious it be; wherefore when ſuch bleeding perſons are taken out of their beds, or when they do timorouſly admit of Phlebotomie, though but ſparingly, or have their members bound for a longer time, or are ſuddenly affrighted with ſome feigned rumour, or by ſome other occaſion fall into a ſwouning or fainting of the ſpirits, the flux of blood ceaſes thereon preſently. The reaſon whereof is evident enough, for that as ſoon as the motion of the heart fails, preſently the blood and ſpirits ruſh thither, and ſo every outward flux is ſtopt on a ſudden, and what was immoderate before, doth not again return.

Remedies by Sympathy and Antipathy.

Eighthly, In the laſt place, for repreſſing the flux of blood from the Noſtrils, Remedies ought to be recited, which are ſaid to operate after an occult manner, by Sympathy or Antipathy, of which ſort firſt is the ſympathetick powder, made of Roman Vitriol calcin'd to a whiteneſs by the Summer Sun; alſo a piece of wood cut from a young Aſh firſt ſprouting about the time the Sun enters *Taurus*; the efficacy of which remedy in the late Civil Wars many worthy of credit atteſt to have been approved for ſtopping the Hemorrhages of wounded Souldiers: Yea ſome ſtill with much confidence preſcribe it in all eruptions of blood. I confeſs the reaſons of effects of this kind are concealed from me, if ſo be they happen often. Beſides, it ſeems not a leſs Empirical and irrational Remedy, that a ſilk Bag with a dry Toad in it, worn on the pit of the Stomach, ſtops any kind of Hemorrhage, and prevents its return: unleſs (according to the Ætiology of *Helmontius*) that the application terrifying the *Archæus*, compells the blood being aſtoniſh'd, either to go back, or deſiſt from its inordinate excurſion.

1. *Sympathetick-powder.*

2. *Young Aſh-wood.*

3. *A dry Toad.*

There remain very many famous Medicines whoſe Operations are wont to be referred to hidden Cauſes and ſecret vertue; as are Necklaces of Blood-ſtone hung about the Neck, alſo the moſs of a humane Skull carryed in the hand; Epithemes of the leaves of Nettles bruiſed and applyed to the ſoles of the feet, and the Palms of the hands; the Empirical adminiſtrations of which kind, when they may be adminiſtred without trouble or coſt, we make no refuſal of; ſince in a dangerous caſe every thing is to be attempted; and applications of that ſort do help ſometimes in reſpect that they fortifie the imagination of the patient.

4. *A Blood-ſtone.*

5. *Moſſe.*

Topicks cloſing the mouths of the Veſſels.

While ſuch like outward Adminiſtrations are uſed, for repreſſing or calling aſide the flux of blood out of the Noſtrils, alſo other Topicks are put up into the Noſtrils, which may ſhut the gaping mouths of the veſſels, for which uſe the injections of liquid things, Pledgets, Powders to be blown in, and Fumes are wont to be preſcribed, which not helping, in the laſt place we deſcend to Eſcharoticks.

6. Eſcharoticks. The injection of Vitriol water.

Ninthly, Among Liquids, not only firſt, but as good as all others is eſteemed the ſolution of Vitriol in Fountain-water. Some boaſt this for a great ſecret, and a moſt certain Remedy. Indeed the ſame being applyed to a freſh wound, foraſmuch as it ſhuts the ends of the cut veſſels, by wrinkling them up, it reſtrains and preſently ſtops the flux of blood. But that application in Hemorrhages of the Noſtrils, where the blood being brought to the gaping mouths of the little Arteries, ought to be received by the Veins, in regard it ſhuts them as well or rather than thoſe, it ſucceeds little, and ſometimes not at all, as I have known it frequently experimented. This Medicine is prepared of Green Vitriol, *viz.* of *Hungary*, or of our Countrey, alſo of the fictitious Vitriol of *Mars* diſſolved in a ſufficient quantity of Spring-water. I know ſome commend the ſolution of Roman Vitriol, which they not only apply by injection, but alſo to a linnen cloath dipt in the blood are wont to adminiſter it ſympathetically. Moreover the water of the infuſion of white Vitriol prepared with Bole and Camphire, I have known to be uſed ſucceſſefully as well in wounds, as often in other Hemorrhagies.

10. *Pledgets.*

Tenthly, Since water caſt into the Noſtrils, doth not adhere enough to the mouths of the Veſſels, but is waſhed away by the breaking out of the blood, before it can exert its Virtue, it is therefore more expedient either that a Styptick powder be blown in, or that a Pledget dipt in the water of Vitriol, either by it ſelf, or ſtrewed with an aſtringent powder, be thruſt into the upper part of the Noſtril. For this purpoſe many and ſeveral kinds of ſtyptick powders have been preſcribed, I have frequently uſed either *Crocus Martis* calcin'd to the higheſt redneſs, or the powder of Camphorated Vitriol, or the vitriolic Soot ſcrap't from the bottom of an old Braſs Pot, the powder whereof I have often uſed with ſucceſs in this caſe. In obſtinate Hemorrhagies not yielding to other remedies, let Pledgets, whoſe tops are dipt in Cauſtick Colcothar, be put up deep into the Noſtrils, that the mouths of the Veſſels being

being burnt, and covered with an Eſchar, all flux of blood may be preſently ſtopt. Many other Errhines to ſtop bleeding are accounted famous with Practitioners, as Hogs-dung, thruſt into the Noſtrils, which by the meer ill ſavour is thought to repell the blood; alſo the ſmoak of Blood dropping on hot Iron, repercuſs'd into the Noſe, the Powder being burnt is alſo taken inwardly. The moſs of a humane Skull unburied, put into the Noſtrils, is commended by many for this effect: but theſe latter applications ought to be referred to the ſympathetick Ætiologie, if they avail any thing.

Hogs-dung.

Burnt Blood.

Theſe things concerning outward Remedies ſtopping blood, the vertue and efficacy of which ought at the ſame time to be promoted by intern Remedies, ſeaſonably exhibited and cooperating.

Therefore a ſlender Diet being inſtituted, and the Patient ordered to keep himſelf in an upright poſture, or not much ſupine, while the aforeſaid Adminiſtrations are orderly adminiſtred, medicines appropriated to the ſame end are alſo preſcribed to be taken inwardly. There will be two ſcopes of Remedies of this ſort, *viz.* 1. That the effervescency of Blood whether incentive or fermentative being ſuppreſſed, the liquor thereof being reſtrained within the veſſels, may pleaſingly circulate. 2. That the more impetuous motion of the heart driving about the blood too rapidly, may be depreſſed by apt Sufflamina's.

Inward Remedyes, whereof are two intentions.

1. The firſt Intention requires Medicines that ſuppreſs the too much kindling of the blood, and appeaſe the undue fermentation thereof, for which intents I uſually preſcribe the enſuing Remedies.

1. Things appeaſing the effervescency of the blood.

Take of the water of Plantane, red Poppy, Purſlain, and frog-Spawn, of each four ounces, Syrup of water-Lillies two ounces, Sal Prunella one dram, mix them for a Julep, the doſe three ounces three or four times a day.

Juleps.

Take Barly-water two pound, Red-roſe leaves one handfull, Spirit of Vitriol what ſuffices to make it gratefull, or about half a dram, make an Infuſion warm for extracting the Tincture, adde Syrup of St. John's*-wort two ounces: the doſe three or four ounces, as oft as they pleaſe day or night.*

Tinctures.

Take leaves of ſtinging Nettles, of Plantane, of each three handfuls, pour upon them being bruiſed Plantane-water 6 ounces, preſs them ſtrongly, let the ſtrained liquor be taken.

2. For the ſecond Intention, to wit, for the cooling of the heart too vehemently beating, Hypnoticks and Opiates are convenient.

2. Intention, to cool the motion of the Heart,

Take water of red Poppies three ounces, Syrup of Diacodium half an ounce, make a draught to take at night. Or,

Is done by Hypnoticks.

Take Conſerve of red Roſes an ounce and a half, Powder of Henbane, and white Poppy-ſeeds of each two drams, Syrup of Poppyes, enough to make an Opiate. The doſe the quantity of a Nutmeg every ſix or eight hours.

Take of Laudanum Cydoniatum one dram, the doſe fifteen drops twice a day in a convenient Vehicle.

Theſe things touching an immoderate Hemorrhage, and the Remedies thereof, when it happens without a Feaver: but that which coming in a feaver ought to be ſtopt in regard of the too great loſs of Blood, is either Critical making an immoderate excurſion, by reaſon of ſome accident, for which the Method and Medicines even now preſcribed with caution and reſpect had to the Feaver may be accommodated; or meerly Symptomatical, which being excited in a malignant and Spotted Feaver, Small-pox, Meaſles, or the Plague, neither ſcarcely can, nor ought to be ſtopt with the Remedies above recited. For letting of blood is not convenient, repelling Topicks, alſo cooling Juleps, or Decoctions, and Narcoticks, have no place here: The chief intention of Healing will be to change the Hemorrhage into Sweating, for a gentle Sweat being raiſed, the flux of Blood often ceaſes, if it be not very dangerous.

Of a Hemorrhage in a malignant Feaver.

Take water of Meadow-ſweet, Tormentil, of each four ounces, Saxons cool Cordial two ounces, Treacle-water an ounce and a half, Acetum Bozoardicum three drams, Syrup of Coral an ounce and a half, Confection of Hyacinths two drams, make a Julep, the doſe ſix ſpoonfuls, every third hour.

Cordial Remedies.

Take of the Powder of Toads prepared half a dram, Camphire two grains, take it every ſixth hour, with the forementioned Julep. Or,

Take Powder of Scarlet-cloth from half a dram to two Scruples, as before.

Take Confection of Hyacinths three drams, Powder of Scarlet-cloth one dram, Syrup of Corals enough to make a Confection; the doſe the quantity of a Nutmeg every other hour.

Take of Biſtort and Tormentil-roots, of each one ounce, the leaves of Meadowſweet, Pimpernel, Wood-ſorrel, of each one handful, burnt Harts-horn two drams, Shavings of Ivory and Hart-horn, of each two drams, boyl them in Spring-water from three pound to two, adding about the end Conſerve of red Roſes three ounces; the doſe three ounces being ſtrained, often in a day.

Second Indication vital.

2. Hitherto of the firſt Indication Curatory, together with the ſcopes of healing, and forms of Remedies, appointed for a Hæmorrhage of the Noſe happening with or without a feaver. The ſecond Indication Vital only preſcribes a ſlender Diet, temperate Cordials, and a fit handling of the Patient. The Proviſion of the firſt is ſo ſmall and eaſie, that there ſeems no need to appoint a Meaſure and Rules for it particularly. About the latter the chief queſtion is, whether we ought to retain them within or out of their beds. Without doubt the languiſhing, and thoſe obnoxious to often ſwounings, are not to be rouſed up, unleſs (as we have already hinted) it be for a Curatory attempt: as to others leſs weak, it ſeems ſo to be determined.

The Poſition of the Sick.

Sometimes in bed, and ſometimes out.

Thoſe whoſe Blood does not eaſily tranſpire by reaſon of the conſtipation of the pores, and is incited into a greater turgeſcence from the heat of the bed, and proner to break out, it will be expedient they not only remain out of bed while bleeding, but alſo ſometimes through extern applications to be cooled in the whole habit of their body, or at leaſt in moſt of their members. Wherefore, *Fabritius Hildanus* relates he ſuddenly cured one of a great Hemorrhage of the Noſtrils, after many things tryed in vain, by putting him into a veſſel of cold water. Alſo with like ſucceſs *Riverius* cured another affected in like manner, being taken out of his bed, and laid on a woollen Matte on the Pavement, he bathed his whole body with Linnen dipt in Oxycrate. Yet this method is not alike convenient for all perſons, or at all ſeaſons; but on the contrary, thoſe whoſe blood is halituous, and enjoying more open pores, doth evaporate eaſily, and being wont to be diſſolved by a more moderate heat encompaſſing them, into ſweat, and from thence find themſelves more quiet, it is more convenient that they remain within the bed, not only while the blood breaks out, but as long as there is danger of its return. For this reaſon it is, that many obnoxious to dreadful Hemorrhagies, during the Summer, when they tranſpire more freely, live exempt from that diſeaſe, but the Winter cold preſſing them, by reaſon of their pores being bound up, they ſuffer under more frequent and dreadful Invaſions.

Third Indication Preſervatory hath two intentions of healing.

3. The third Indication Preſervatory, which regarding the removing the Cauſe of that diſeaſe, either ſtops the eruptions of blood, or renders the ſame more rare, or leſs, and ſuggeſts theſe two Intentions of healing, *viz.* 1. That the blood being reſtored to its due temperament and mixture, may quietly circulate within the veſſels, without turgeſcency and breaking out. 2. That the Veſſels carrying Blood, as to the ſtructure of their little mouths, and the tenours of the muſcular fibres, may be contained in their due ſtate; ſo that they neither cauſe thoſe inordinate tendencies of blood towards the Head, nor ſuffer effluxes out of the noſe: For both theſe ends too great plenty and impurity of the Blood are carefully to be provided againſt by Phlebotomy and Purgation ſeaſonably uſed; afterwards for procuring and conſerving its good temperature, the following Alteratives may be given at fit ſeaſons of healing.

Forms of Remedies.

Take of Conſerve of red Roſes, of Hipps, an. three ounces, powder of all the Sanders an. half a dram, Coral prepared one dram, of the reddeſt Crocus Martis *two drams, Sal Prunella four Scruples, with Syrup of Coral, make an Electuary, take the quantity of a Cheſnut early in the morning and at night, by it ſelf, or drinking after it three ounces of the following water.*

Take the tops of Cypreſſe, Tamaris, an. eight handfuls, St. Johns-wort, Tamariſk, Horſetail an. four handfuls, of all the Sanders bruiſed an. one ounce, of the Crum of White-bread two pound, ſlice them ſmall, and pour on them of new milk eight pound, diſtill

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in a cold Still, ſweeten each doſe when taken with Syrup of the juice of Plantane.

Take leaves of Plantane, Brooklime, ſtinging Nettles, of each four handfuls, to them bruiſed pour half a pound of the foregoing water, of ſmall Cinnamon-water two ounces, preſs them ſtrong, the doſe three ounces to four, at Nine in the Morning, and at Five in the Afternoon.

Medicines of this ſort are taken in Spring and Autumn for twenty or thirty dayes, with ſometimes a gentle Purge coming between. In Summer let them drink Mineral Steel-waters for a Month, than which in this caſe there is not a better Remedy. Out of many Examples of perſons labouring with an Hemorrhage, we only propoſe this one ſingular caſe.

An Example of a rare Hemorrhage.

I was lately conſulted at a diſtance for a certain Gentleman that had ſuffered frequent and great eruptions of blood, one while at the Noſtrils, another while at the Hemorrhoid Veſſels. He had frequently uſed Phlebotomy by perſwaſion of his friends, without benefit; yea frequently falling into cold Sweats and Swounings after breathing a vein, and notwithſtanding obnoxious to eruptions of blood, he was wont to be much worſe. I preſcribed Juleps (having not yet ſeen him) and cooling Decoctions, and Anodynes, alſo the juicy expreſſions of herbs, and other things cooling the blood, but even from theſe, (as if all ſtill far enough from the ſcope) he was nothing the better. At length being ſent for into the Countrey to viſit him, I found the affection under which he ſuffered to be meerly or chiefly convulſive; for whereas he daily bled, his Pulſe was weak, the extreme parts cold, and all his Veſſels as being too much emptyed fell flat; alſo the patient was affected with a continual Vertigo and trembling of heart, and by and by with a ſwouning or fear of it. Really the blood was ſo far from breaking out by reaſon of turgeſcence, that rather the ſtream thereof being depreſſed and ſmall, it ſeemed ſcarce enough to ſuſtain the current of Circulation. Notwithſtanding the truth of the matter was, he was often ſenſible of ſomething in his body creeping one while upward, another while downward like wind, and for the moſt part the flux of blood out of his Noſtrils or Hemorrhoids, followed the tendency of that motion: hence it was eaſie to conclude, that the moving fibres of the Veſſels carrying blood, by which they are contracted, being affected with a Convulſion, did diſorderly convey the ſtream of blood however ſmall and low, to and fro, and ſo compell it into Eruptions: which alſo happen'd the eaſier, inaſmuch as the mouths of the veſſels being laxe and gaping, ſuffered the blood forc'd into them to flow out without any due reſiſtance. The inſtituted method of Curing did plainly approve of this Ætiology, inaſmuch as it happily ſucceeded, leaning on this ſuppoſition; for Blood-letting, and the uſe of Medicines ſtopping blood being at laſt omitted, I preſcribed the uſe of the enſuing Powder, a doſe whereof he took every ſixth hour with a fitting Julep.

Its Ætiologie.

His Cure.

Take the powder of male Pœonie, red Coral, Pearles, of each one dram, Ivory, Crabs-eyes, Blood-ſtone of each half a dram, Lapis Prunellæ one dram, make a Powder, the doſe half a dram.

Take of Black-cherrie water eight ounces, Balm, Barly Cinnamon-water, of each two ounces, Treacle-water one ounce, Syrup of Coral an ounce and a half.

But I commanded that Ligatures ſhould be applyed to certain places by a conſtant courſe, and by and by to other places as occaſion ſhould be given, as well to ſtop as to intercept the Convulſions of the Veſſels; and by remedies of this kind, and means of adminiſtration, he recovered his health in a ſhort ſpace, without any return of the diſeaſe.

SECT.

SECT. III. CHAP. III.

Of Vesicatories.

OF losing Blood by Phlebotomy, whensoever it is troublesome and injurious, and swells too much, and tumultuates within the vessels; also of retaining it by Medicines stopping Blood, as often as being outragious it rages too much of its own accord and flows out, we have hitherto largely discoursed. There remain other certain humours, *viz.* Nervous and Nutritious, as also Serous, and other recrementitious ones which are wont to flow within the Brain and Nerves, and as well in the nervous fibres, as the fleshy, yea and within the Pores of the skin and of the solid parts, which being often depraved or hindered in motion, require emission, being otherwise about to raise great troubles or pains, and frequently dangerous Diseases. Wherefore, that we may seasonably rencounter distempers that are about to rise or take their origin from thence, Physick hath found out certain other Emissaries, mediately or immediately deriving the forecited humours out of the parts and places where they shall offend. And those are either continual, *viz.* Fontinels of diverse kinds, which are as it were perpetual Drains, and pour out continually the Ichor; or they are temporary, when as occasion requires, the Scarf-skin being taken away in some part of the body, the extremities of the vessels in the skin are made naked, and withall so provok'd, that they spue out in great abundance the serous humours of a various descent and disposition, and so continue to evacuate the same for some time, one while longer, another while shorter. But such a manner of drawing out the serous humours from the outward superficies of the body or any part thereof, is wont to be procured by Medicines called by the Ancients *Phænigms*, or *Sinapismus*, by Moderns *Vesicatories*; of which in the first place we will treat here, (because the knowledge of these leads the way to the Doctrine of Fontinels) and we will chiefly insist on unfolding these three things; *viz.* First, It shall be shewn, from what Bodyes, and after what manner disposed, Vesicatories are wont to be prepared. Secondly, Whereas they are of diverse kinds, it shall be declared what is the manner and reason of their operation in every one, or at least in the chief of them: Thirdly and lastly, we will make search for the curing of what sort of Distempers they ought to be appointed, and in what places applyed.

Vesicatories antiently called Phenigms and Sinapisms.

1. *Of what prepared.*

1. As to the first, the most simple Blisterers are either Fire, or solid Bodies, or Liquors endued with fiery particles; (which are seldome administred for this use by reason of the terror which they impress, and the imminent danger, lest being more strongly apply'd, they do not only blister the Scarf-skin, but burn the skin and other parts.) Let therefore what is safer and less dreadfull, Epithemes out of Concretes having more sharp and (as as is affirmed) potentially fiery particles, be applyed to the places to be blistered, which are either milder, and by the Ancients were call'd *Phænigms*, because they made the part red, the Scarf-skin taken away; or were call'd *Sinapisms* in respect of the matter, and were wont to be prepared of Mustard, Pidgeons-dung, Squills masht, Garlick, Milk of Figs, and the like; or they were stronger, and consisted of *Euphorbium*, *Cantharides*, *Flammula Jovis*, Crows-foot, greater Plantane, with many others, which being endued with a certain burning and caustick quality, are used outwardly for the use above recited, but taken internally, they prove venemous and frequently mortal.

1. *From actual Fire, or things imbued with it.*

2. *From things potentially burning.*

The Composition and forms of things drawing blisters are reported to be manifold and of sundry kinds, although one or two may here suffice, and by how much the more simple, the better; and in most cases for the most part 'tis all one which you use: notwithstanding we shall after our manner annex some select Prescriptions of these kinds of Remedies. And that we may say little of *Dropaces*, *Sinapisms*, and *Phænigms*, whose use is almost exploded; almost all Vesicatories now in use have Cantharides for their Basis.

Forms of Vesicatories.

Take powder of Cantharides half a dram, to a dram, powder of Ameos-seeds one scruple, of old Leaven kneaded with Vinegar, enough to make a Plaister, spread some of it on Leather,

Leather, apply it twelve hours to the place to be bliſtered. This works certainly and ſtrong enough: but becauſe it is leſs compact and ſticking, and may fall from the place to which it is put, or is apt to crumble, therefore for the more commodious application, this following is very convenient, and now in uſe with moſt.

Take of Cantharides three drams, Euphorbium half a dram, powder of Ameos-ſeeds one dram, let be incorporated with Melilote-Plaiſter by a warm hand, as much of this powder as it is capable to receive, then ſpread it on Leather, and apply it for twelve or ſixteen hours.

A more delicate Veſicatory with a Dropace.

Some do uſe to incorporate the foregoing powder with *Burgundy* Pitch, and ſpread it upon Leather, afterwards to cover the ſides with red Sanders incorporated with *Burgundy* Pitch, and ſo adminiſter both a Dropace and a Veſicatory. Alſo by applying ſtill the ſame Plaiſter, the Scarf-skin being bliſter'd and taken off, and the place being red, and ulcerated, and only wiping it once or twice in a day, and putting it on again, they cauſe the little Ulcer raiſed by the Veſicatory, to flow at pleaſure, yea ſometimes above a month, and to throw off a plentiful Ichor.

Others incloſe Cantharides bruiſed, and ſprinkled with Vinegar in Silk, and apply to the place.

Some Empiricks uſe in the room of Cantharides a maſs of the leaves of Crow-foot, or *flamula Jovis* bruiſed on the place, by which the Scarf-skin being bliſtered, or rather eaten, the skin it ſelf, as if toucht with an actual fire, is much inflam'd and deeply ulcerated; whence not only a profuſion of Ichor but an inflammation of the whole member, and a feaveriſh diſpoſition ſometimes follow: wherefore theſe things are not to be uſed raſhly.

2. How they operate.

2. If it be enquired of the manner and reaſon how theſe and other Veſicatories operate: in the firſt place we ought to ſhew by what manner actual Fires, and things endued with particles proceeding from Fire, do raiſe a bliſter; then by an eaſie Analogy the force and manner of working of thoſe ſorts of remedies will be known, which are reported to be endowed with a potential fire. Wherefore we obſerve of the former, that the fiery particles not being too vehemently applyed, penetrating the Scarf-skin without diſſolution of unity, enter under the skin it ſelf, where the extremities of the veſſels bringing blood, of the Nerves, and of the nervous Fibres are terminated; and there do variouſly twiſt together theſe, altering them from their poſition, and pervert the ſtructure of the whole texture of the skin: inſomuch that from all the veſſels being made angry in a high degree, the watery humour being imbued with igneous particles, and therefore rejected, as well by the blood as by the nervous Juice, is ſpued out in great abundance: This Lympha, becauſe it cannot paſs through the Scarf-skin, ſeparates it from the skin, and raiſes it into a bladdery bulk, from which at length being broke of its own accord, or occaſionally, it flows out. Moreover as long as the igneous particles adhere to the skin, and the mouths of the Veſſels, being covered with an Eſchar, are not cloſed up, theſe being continually twitched by them, do continue to ſpue out the Ichor. This kind of ichorous flux will the ſooner ceaſe, if immediately upon the hurt inflicted, the fiery particles be drawn out, by the application of ſome proper Antipyretick, as Fire it ſelf, Nitre, Soap, Onions, and the like. Moreover it runs the longer, if omitting an Antipyretick, medicines hindering the generation of a Cicatrice, or of the outer-skin, and unlocking the mouths of the veſſels, be worn upon the place affected.

Shewed by the example of Fire.

How Cantharides excite Bliſters and draw forth water.

By theſe it is eaſie to underſtand by what manner Veſicatories perform their operation, *viz.* Cantharides (as likewiſe any other of the ſame vertue) being outwardly applyed, and being heated by Effluvia's of the parts ſubjected, and ſo being provok'd to exert their power, do plentifully diſpatch ſharp and as it were fiery particles from themſelves, which penetrating the Scarf-skin without any tearing it, they are daſhed againſt the *Cutis* or other skin, where firſt they act upon the Spirits, and then by the affecting theſe, upon the Humours and ſolid parts. They very much provoke the Spirits, and drive them into painful Convulſions of the fibres, diſſolve the Humours, and conſtrain them to ſeparate into parts, ſo that the watery part being very much embued with thoſe ſharp, and as it were venemous particles, is rejected every where by the other Juice; and when in the mean time the ends of the Veſſels and Fibres are either eaten by the burning, or opened by twitching, and as it were drained, that Ichor conveying the hurtful particles is plentifully ſpued out of their little mouths; which then ſeparates the impervious *Cuticula* or the Scarf-skin, from the other

other skin or *Cutis* it ſelf, and raiſes it into a little bladder, and after this being broken and taken away, it is for ſome time poured out by the ulcerated skin (as we ſhewed it to come to paſs by reaſon of the particles of fire.)

Why they bring a fervent Dyſurie.

But this is not only done, becauſe the ſerous Juice imbibing the ſharp parts of the Medicine, and conveying them out, doth not always bear them all back the ſame way by which they entred, but ſometimes this being endued with theſe ſtings, regurgitates into the maſs of Blood; and afterwards being circulated with it, and ejected with its infeſtous burden through other Emunctories, offends ſome weak or tenderer Channels in its paſſage or going forth; from whence very many contract a Strangury, from great or many Veſicatories, by reaſon of the urinary paſſages being affected for that cauſe with Acrimony or Eroſion, which in ſome becomes moſt ſharp and intolerable. Alſo that application ſometimes brings bloody Urines to others afflicted with the Stone; hence a ſuſpicion alſo ariſes, that thoſe who have tender Lungs, or who are ſubject to a Conſumption, are much endangered by this Medicine outwardly applyed; which notwithſtanding I have not known happen to any; but can rather atteſt by frequent experience on the other ſide, that it redounds to advantage rather than hurt. For the more ſharp particles of Cantharides, if they be long applyed, being ſometimes imbibed more plentifully by the blood, infect its whole Serum: which Juice ſo ſharpened, as long as it is confounded with the Balſamick blood, hurts no part; but being ſeparated from it by the Kidneys, it ſometimes brings hurt to them, and frequently not only twitches the neck of the Bladder by its Acrimony, but ſometimes corroding it, cauſes filth, and little skins, nay and blood to come away: but in the maſs of blood, the ſame more ſharp, ſaline-volatile particles do often moſt notably help; inaſmuch as they deſtroy the fixt or acid Salts in it, and unlock the conſiſtence of the blood too much bound up, and ſo do cauſe the ſerous and other morbific recrements before wrapt up with it, to be ſeparated from it, and to be more eaſily diſpatched by Urine and Sweat; hence Veſicatories being applyed long in Feavers do call forth plentifull Urine and a more eaſie Sweat. Alſo they open the obſtructed wayes, and move together the portions of Blood or Serum, ſtagnating or being extravaſated in any place, and reſtore them to their Circulation. Wherefore they are not uſed only to help in ſerous maladies, but alſo in thoſe of the blood, yea in a Pleuriſie, Peripneumonia, and in any other Feavers.

Veſicatories move Sweat and Urine.

Having hitherto ſhewed after what manner Veſicatories operate firſt on the Spirits, and then on the Humours and ſolid parts, it is now our buſineſs in the next place to ſhew both the good and evil effects of them, as alſo the manners of uſing them. But that they in the firſt place operate on the Spirits is manifeſt from hence, that they exert no power on the deceaſed, and it is an ill Omen in thoſe that are languiſhing, when Veſicatories have no operation, becauſe it is an Indication that the Animal Spirits are much dejected, or abundantly diminiſhed.

The effects of Veſicatories.

Therefore, it behoves to conſider about the due unfolding the energy, force or virtue of this remedy, what humours it either immediately or mediately evacuates or alters; and afterwards in what Diſeaſes, and bodies how diſpoſed it either profits or hurts.

1. *As to humours of the Skin.*

Firſt, As to the former, the humours that are immediately ſent out by a Veſicatory, drop forth partly from the pores and glandules of the Skin, and partly out of the mouths of the little Arteries, and partly out of the extremities of the Nervous fibres; perhaps ſome little of the Juice newly received, out of the mouths of the veins, though not much, ſeems to be carryed back. The humours mediately drawn out by a Veſicatory are thoſe which the aforeſaid parts being emptyed receive elſewhere, and derive them forth.

1. The Skin is a thick Membrane conſiſting of a double Coat, very porous, alſo thick ſet about with moſt numerous glandules, with fat, as alſo the ends of the Veſſels and fibres being terminated therein, and thickly woven one within another. Wherefore, while a portion of it is made bare, the Scarf-skin being taken off with a Veſicatory, and the nervous fibres being twitched, do bind together, and wreath the glandules and pores, the ſerous humour contained in both, is moſt plentifully ſqueezed out. And whereas ſome pores are pervious into others, the Serum doth not only flow out of the place bliſter'd, but ſometimes into the little holes firſt ſo emptyed, a portion of the Serum coming from the neighbouring pores ſucceeds, and thence by and by ſweats out: wherefore in Patients affected with an Anaſarca, the little ulcers

ulcers raiſed by a Veſicatory, exhauſt the waters every where in great plenty, and draw them out of the neighbourhood, yea and ſometimes at a great diſtance.

2. The little mouths of the Arteries being uncovered and twitched about the bliſtered place, do not only vomit out a portion of the Serum brought to them, by ordinary cuſtom, but the ſerous liquor being imbued with the Stimula of the medicine in the whole maſs of blood, immediately is ſeparated more plentifully from the blood; and at every turn of Circulation a greater plenty thereof is thrown out by the ſame mouths of the Arteries continually irritated: Moreover together with the Serum as it were ſo ſtagnating, and therefore removed from the whole blood into the little ulcers of the skin, other recrements and ſometimes the morbific matter it ſelf depart in plenty, and are diſpatched forth by the ſame Emiſſaries; and for this reaſon in malignant feavers, yea in ſome putrid, that are difficult to be judged of, when the recrements and corruptions of the blood, unapt to be thrown off, do threaten the Præcordia or Brain, Veſicatories continually and leiſurely draining it, do frequently yield notable relief; whereunto we may adde, that they do alſo alter and reſtore (as we before mentioned) the blood degenerate or depraved as to its Salts, and alſo by opening or ſubtilizing its conſiſtence, diſpoſe it towards an Eucraſie; wherefore, not only in a feaveriſh ſtate of Blood, but alſo in a ſtate otherwiſe peccant, or of ill Juice, this kind of remedy is often extreamly convenient.

2. In reſpect of the blood.

which they purge and alter.

3. Both reaſon and experience have enough proved, that Veſicatories evacuate a certain humour from the Nerves and nervous Fibres, and for that cauſe profit very much in convulſive diſtempers: For ſurely we have in another place clearly enough demonſtrated, that the watery liquor of the Brain and Nervous ſyſtem, doth ſometimes abound with heterogeneous Particles. Alſo it is manifeſt by frequent and familiar obſervation, that the impurities and recrements of that liquor, together with the watery Juice, do ſpontaneouſly ſweat out from the Nerves and nervous Fibres, when the fluor is raiſed, and either reſtagnating within the maſs of blood, are carryed off by Urine or by Sweats, or being depoſited within the Cavities of the bowels, are diſpatched by Vomit or Stool. Wherefore, when a Veſicatory is applyed, the extremities of the Nerves and nervous Fibres being made bare, and very much angred, immediately a humour abounding near their ends is voided; and alſo the whole Juice planted within their paſſages by a long ſucceſſion, is chafed, and delivered from ſtagnation; and the heterogeneous particles mixt with that nervous Juice, being every where agitated and derived from the Brain, ſlide towards their newly opened Emiſſary, by degrees, and at length are removed wholly forth.

3. In reſpect of the Nerves and of the humours abounding in them and in the nervous parts.

From theſe things we may collect, for the Cure of what Diſeaſes this kind of remedy doth chiefly conduce; for by reaſon of its evacuation out of the pores and glandules of the skin, as often as any ſerous, ſalt, ſharp, or otherwiſe hurtful humour is collected in thoſe parts, or their neighbourhood, and being excluded from the Circulation of blood, ſhall obſtinately ſtick in that place, ſurely there is no more ready or eaſie way afforded for drawing it forth, than by applying a Veſicatory, upon or below the place affected. Wherefore, it is not only indicated by an Anaſarca, or by any foulneſs or eruptions of the Skin, but moreover a Veſicatory is required for pains either arthritical or ſcorbutical, fixt any where in the extern habit of the body, or in any certain member.

For the curing of what Diſeaſes Veſicatories are convenient.

1. In all cutaneous Diſtempers.

Secondly, In reſpect of the Blood, Veſicatories are always uſed in malignant Feavers, as well to purge out leiſurely any heterogeneous or morbific matter, as to change it from a diſpoſition either too acid, or ſalt, or otherwiſe peccant, into a right temperament; yea they are of moſt excellent uſe in all putrid feavers of ill habit and hard to be judged of. Alſo for that cauſe in the Scurvy, Leucophlegmatia, *Pica Virginum* or Green Sickneſs, alſo in any other ill habit of body, this kind of remedy affords frequently notable help. Moreover not only for the ſake of correcting the blood it ſelf, but beſides as often as it being depraved ſpreads its corruption on other parts, and ſo doth firſt beget diſeaſes in the Head, the Cheſt, the nether Belly, or Members, and then excites their Fits, Veſicatories are uſually exhibited with ſucceſs. Wherefore it is a common remedy in Head-aches, a Vertigo, and ſoporiferous affections, no leſs than in a Catarrh or any defluxion either into the Eyes, Noſe, Palate, or Lungs, in which every one without conſulting a Phyſician, will preſcribe to themſelves Cantharides for Revulſion. I confeſs, when I have often been ſurprized with a great Cough, with abundant and thick Spittle (whereto I am originally obnoxious) I have received relief from no other Remedies more than from Veſicatories; wherefore I am wont, while

2. They take away the impurities and ill temperament of the blood.

This Remedy is profitable in thoſe Diſeaſes which the blood produces in other parts.

that diſtemper doth urge, to apply Medicines drawing bliſters firſt upon the Vertebra's of the Neck, then thoſe little Ulcers being healed, beneath the Ears, and afterwards if need require it upon the Scapula's; for ſo the ſerous filth looſened from the conſiſtence of the blood ſweating forth, is derived from the Lungs, and alſo the mixture of the blood ſooner recovers its temper, inaſmuch as after this manner its enormous ſalts are deſtroyed.

3. Alſo in all Diſtempers of the Brain and of the nervous Stock.

Thirdly, In reſpect of the Humour, *Epiſpaſticks*, as they are of moſt common uſe, ſo they are wont to confer great help, in ſoporiferous, convulſive and painful diſtempers, for deriving and evacuating it out of the nervous ſtock and the brain it ſelf. Was ever any ſurprized with a Lethargy, Apoplexie, or Epilepſie, but that immediately Friends and Attendants however unexpert, have tormented his Hide with the application of Cantharides? In ſtupendious convulſive motions, aſcribed uſually to nothing leſs than Witchcraft, I have applyed Veſicatories with great benefit in many parts of the body at once, and I have continued them above a Month, preſently renewing them in freſh places. And alſo pains that are fixt and moſt fiercely tormenting in the membranous parts, are ſeldom cured without this adminiſtration. For ſometimes morbific humours and Particles which being deeply radicated, yield nothing at all to Purgers or ſweating Medicines or Diureticks, yet have ſeemed to have been pulled up by the roots by Veſicatories, as it were remedies laying violent hands on the diſeaſe.

For what Diſeaſes Veſicatories are intended.

But this Remedy although moſt general is not uſed to operate ſo eaſily and happily in ſome Diſeaſes and Conſtitutions; wherefore we may not raſhly or indifferently uſe it towards all perſons. For thoſe who are Nephritick and obnoxious to a frequent and painfull Strangury, ſcarce ever endure the application ſcot-free; wherefore, on thoſe that are ſo affected we muſt not uſe Veſicatories, unleſs in malignant Feavers, or acute Cephalick Diſeaſes, for avoiding the greater Evil.

In what Conſtitutions they agree beſt.

As to what relates to the various Temperaments and Conſtitutions of men in reſpect of which Veſicatories are uſed to be more or leſs convenient or advantageous: Concerning theſe, this threefold notable difference occurs. In the firſt place, ſome perſons for the moſt part endure well the uſe of this Medicine, and the little Ulcers raiſed thereby in the skin, ſweat out an Ichor ſufficiently plentifull without any Dyſurie, or great Inflammation of the place bliſtered; and then heal of their own accord; which effect ſucceeds only in blood of a good temperament, where, to wit, the Salt and Sulphur being moderately and rightly conſtituted, there is preſent an abundant plenty of Serum; whoſe Juice eaſily and more largely ſeparating from the reſt of the blood, carryes away the ſharper particles of the Medicine imbibed with it ſelf, and partly ſweats them out through the place bliſter'd, and partly conveys them out without prejudice by the Urinary paſſages; therefore alſo the advantagious effects now recited are produced in the maſs of blood.

Alſo in whom not.

2. But ſecondly this remedy with ſome doth neither well agree, nor operate profitably; becauſe it rubifies the place very much to which it is applyed, or rather excoriates it with moſt fierce pain and great inflammation; notwithſtanding the little ulcers made in the ſame place, although they do for ſome time torment the patient, yet pour out very ſmall or ſcarce any Ichor: Alſo to theſe always bliſter'd with torment, for the moſt part a violent Strangury happens. The uſe of theſe Veſicatories being troubleſome and unſucceſſefull, doth frequently happen to men of a cholerick and hotter temperament; whoſe blood is endowed with a plentiful Salt and Sulphur, and a ſmall quantity of Serum, being more throughly concocted with the reſt. Wherefore, when the Juice that ought to carry away the more ſharp particles of the Medicine, doth neither eaſily nor plentifully paſs from the reſt of the blood, (that it may ſpeedily waſh them out) thoſe particles ſticking ſtill in the skin, do as it were infect and impoyſon the blood it ſelf, paſſing through, and for that cauſe being impeded from its circuit, they cauſe it to ſtagnate, and to be gathered together about the extremities of the Veſſels, whence they are inflamed. Moreover the ſerous Juice being ſeparated by the Kidneys when of it ſelf it is little and ſharp, and beſides becomes ſtinging from the particles of the Medicine, it irritates the Neck of the Bladder, and frequently corrodes it by its acrimony.

In men of a more hot temperament they torment the part and do not draw forth the water.

In others, inaſmuch as they draw forth too much Ichor, they are not profitable.

3. There remains a third Caſe although more rare, relating to bliſtering, to wit, in whom little Ulcers being raiſed in the skin, preſently pour out the ſerous humour in ſo great abundance, that in a little time it will be neceſſary to give repelling Medicines, and that ſhut the mouths of the Veſſels; otherwiſe, from too much flowing out of waters,

waters, a diſſolution of ſtrength, and a fainting of the Spirits are in danger to enſue. This I have known ſo conſtantly happen to ſome Patients, that afterwards I was fain to reſtrain their uſe of Cantharides although there was need of them; the reaſon whereof ſeems to be, that the blood being endowed with a ſalt Serum, and more ſharp than it ought to be, hath a conſiſtence too eaſily diſſolved: wherefore, that ſerous juice being ſharp, and fretting of it ſelf, as ſoon as it is provok'd by the particles of the Medicine looſening the conſiſtence of the Blood too eaſily diſſolved, immediately breaking out with violence from the maſs of blood, whereſoever there is a paſſage afforded, it flows out with a full torrent through the mouths of the veſſels gaping in the bliſtered place. Beſides this too much flowing out of the Serum, raiſed from the firſt application of the Veſicatory, ſometimes happening late in malignant Feavers, and in others ill, or not at all judged, and remaining a good while, wholly conſumes the morbific matter, and delivers the Patient from the jaws of Death. In ſuch a Caſe after the little Ulcers for the firſt days have poured out little or a very ſmall quantity of Ichor, at length Nature attempting a Criſis by this way, a vaſt Illuvies of Serum flows out from the ſame; and ſo ſometimes for many dayes, nay weeks, continues to flow out, untill the Patient before accounted deſperate, recovers his entire Health. Little Ulcers ſo abundantly flowing, as it is not eaſie, ſo it is not ſafe to ſtop them before the whole Mine of the Diſeaſe be conſumed. Not long ſince, a famous Doctor of Phyſick in *London*, ſcarcely recovering from a malignant Feaver, did copiouſly ſweat out Ichor daily from places bliſtered in ſeveral parts of his body; after ſome time (they being troubleſome and tedious) he did apply ſtronger Repercuſſives to them all, and immediately reſtrained their flux. Thoſe ſluces were ſcarce two days ſtopt, but his diſeaſe revived, and on the ſudden he was affected with fainting of Spirits, and often ſwooning, a cold Sweat, and a low weak Pulſe: and whereas he could not be relieved by any Remedies, however cordial they were, he dyed within three days; the cauſe of which ſeems to be, that the malignant matter being ſuddenly repercuſſed, fell into the Cardiac Nerves, whoſe action being hindred, the vital function quickly failed.

The Ulcers of Veſicatories do ſometimes plentifully flow in Feavers, and give Judgment of the Diſeaſe.

They are not to be cured.

An Example is ſhewn.

SECT. III. CHAP. IV.

Of Fontinels, or Iſſues.

BEſides Veſicatories, which being as it were the extemporary Emiſſaries of the Serum, and other humours externally to be brought forth, are only raiſed upon ſome occaſions, and then after their efficacy a little ſhewed, are permitted to be dryed up; there are others eſteemed as it were continual Fountains, therefore named *Fonticuli* or Iſſues, out of which the Ichor or ſerous humour flows with a conſtant Spring. Thoſe former, as they are requiſite for the moſt part for Cure-ſake in acute or other Diſeaſes, whoſe morbifick matter requires a quick diſpatch, in the firſt place reſpect the conjunct cauſe of the Diſeaſe to be removed; and therefore being more broad, are made only ſuperficial, that ſuch little Ulcers being large, may evacuate much, and then eaſily be healed: but on the other ſide, Iſſues being chiefly indicated for preſervation, are ordained to remove or vanquiſh the procatarctick cauſe of the Diſeaſe: wherefore they conſiſt of a more narrow orifice, but made more deep through the thickneſs of the whole skin, to the end, that while they ſend out the morbifick matter in leſſer quantity, they may derive it further, and continue longer to purge it out.

Iſſues rather a preſervatory than curatory Remedy.

There are three chief heads of diſquiſitions concerning Iſſues, *viz.* Firſt, what humours theſe Emiſſaries chiefly evacuate, and whence they bring them: Secondly, in what Diſeaſes or Conſtitutions they better or worſe agree: Afterwards Thirdly in what places, in what form, and with what inſtruments they ought to be made.

About theſe, three things are to be enquired into.

1. As to the former, Iſſues, like Bliſters, purge out all humours fixt within the skin, (although in a leſs compaſs,) or brought through it as well by the ſanguiferous, as nervous Veſſels, not only as they provoke, or as it were ſuck the outer ſuperficies of the skin, but by piercing through the whole hide or skin, they convey out

1. What humours they evacuate.

out whatſoever flows from the ſides of the orifice through the broken Veſſels, alſo whatſoever ſlides down elſewhere beneath the orifice. Wherefore not only humours accumulated within the pores of the skin, or glandules, or brought thither by the Arteries, or Nerves, have conflux to Iſſues; but moreover the ſerous recrements under the skin, that are wont to be tranferr'd, or creep between the interſpaces of the muſcles and membranes from place to place, tend every where unto them and find paſſage. Moreover an Iſſue appointed in the way anticipates morbifick humours, which were formerly wont to be conveyed to other weak and long afflicted parts, and by ſuch means exempts one while this part, another while that, from their invaſion. Hence either a Gouty, or Nephritick, or Colick matter, and ſometimes a Paralytical, or otherways ſcorbutical, are frequently intercepted by Fontinels, in their paſſage from their Source to their neſts or places of reſidence, and ſo are conveyed forth, and the uſual aſſaults of a diſeaſe declined: Neither doth this Emiſſary leſs purge from thence by degrees the humours impacted in any part or region of the body, and there cauſing prejudice, than water-furrows made for derivation of moiſture, and ſo prevent or cure a ſickly diſpoſition.

2. In what diſeaſes they chiefly prevail.

2. From theſe ſeveral accounts of aſſiſtance, whereby Iſſues in general are wont to help, it is eaſily collected, for what diſtempers they are chiefly required; for although there is ſcarce any diſeaſe happens, wherein this remedy is either hurtfull or unprofitable, notwithſtanding it ſeems rather more neceſſary in ſome caſes than in others. It is commonly preſcribed for almoſt every diſeaſe of the head, whether outward or inward: Every one of the ordinary people procures an Iſſue as equal to all other Remedies, for the Convulſions of Infants, or Youths, for Sore-Eyes, Kings-Evil, as alſo for Head-ache in perſons adult or ancient, for drouſie, vertiginous or Cramp-like diſtempers. Neither is it leſs celebrated againſt diſeaſes of the Breaſt; As who is obnoxious to a Cough, bloody or conſumptive Spitting, or an Aſthma that long enjoys his skin whole? In like manner Iſſues are commended in affects of the lower Belly; ſcarce any Hypochondriacal perſon or Hyſterical woman, in like manner no Gouty or Cachectical perſon, but hath his skin pierc'd in many places like a Lamprey. It would be a vaſt work to recount here particularly all the Diſtempers for which Fontinels are helpfull.

3. In what Bodyes they agree not.

3. But really this remedy, however advantagious and benign of it ſelf, doth not agree with all perſons, nor is it indifferently to be preſcribed to every one. For there are two ſorts of men, which though ſick, are to be excuſed from Iſſues, inaſmuch as this Emiſſary evacuates too much in ſome, and too little in others, or leſs than is convenient; and in the mean while remains very painful and intolerable.

Viz. Firſt where they evacuate too much.

Sometimes a Fontinel is not convenient, becauſe it too much evacuates or conſumes the humour or Spirits. For I have obſerved in ſome, that an Iſſue made in any part of the body, pours out an immoderate quantity of Ichor, and peccant in quality: for out of it by often turns, if not continually, a watery, thin and fetid Juice, oftentimes diſcolouring the Pea and Coverings with blackneſs, flows out in great abundance, and ſo the ſtrength and fleſh is impaired by too great an Efflux thereof.

Why they often pour out the humour too much.

The reaſon whereof ſeems to be this, that in ſome perſons endued with an ill diſpoſition of blood and humours, a wound being made and hindred from healing up, degenerates ſtraightways into a filthy and malignant Ulcer; the ſides whereof put on the nature of an acid corruptive ferment, whereby the portions of blood continually forced thither, are ſo tainted and diſſolved, that the Serum thereof imbued with the diſſolved Sulphur, and other Corruptions, being refuſed by the Veins, flows out there copiouſly. Moreover, this putrifying pollution of an Iſſue being communicated to the blood, depraves in ſome part the whole maſs thereof, and ſo at leaſt (as alſo by too much loſs of the ſerous Juice) it is rendered leſs nutritious: Beſides, from the Sulphur of the blood diſſolved near the ſides of the Iſſue and flowing out with the Serum, the ſtreaming Ichor doth ſo ſtink, and black the Covering. Sometimes an Iſſue pouring out the ichor not immoderately, conſumes the ſpirits and ſtrength more than it ought, which really we take cogniſance of from the effect, and ſometimes not till afterwards; inaſmuch as ſome, while they bear about them one or more Iſſues, remain feeble and lean; but they being ſtopt preſently become vigorous and more plump. Moreover, it is a common obſervation, that many from an Iſſue raiſed near the head, have been preſently ſurprized with a certain defect, and weakneſs of ſight, inſomuch that they have been conſtrained immediately to heal it up: which ſeems to

Why they expend the Spirits too much.

happen

happen for this cauſe, for that where the proviſion of ſpirits is ſmall, and their conſiſtence very thin, the ſmall loſſes of them, or of the Juice from whence they are procreated, if ſo be they are conſtant, are difficultly endured.

Iſſues are likewiſe inconvenient when they evacuate leſs than they ſhould doe.

But in another and different reſpect, Iſſues like Veſicatories are forbid to ſome, or very cautiouſly preſcribed, for when they evacuate little or nothing at all, they very much vex the place, where they are made. For in perſons endued with a cholerick, or hotter conſtitution, the maſſe of blood being thicker than it ought to be, and leſs diluted with Serum, becomes more bound in its conſiſtence; in theſe the ſolution of Continuity being made and kept by reaſon of the Iſſue, the blood it ſelf (for that it doth not ſufficiently diſcharge its Serum, whereby it may go away) ſticks in the paſſage, and ſo being extravaſated, cauſes a very painfull inflammation; and in the mean while, as it pours out little ichor, it remains as well unuſefull as troubleſome. The operation and uſes of Fontinels and their indications being deſigned, we ſhall ſhew in what place, in what form, and with what inſtruments they ought to be made, and after what ſort to be managed.

The places of Iſſues are deſigned, according as the ends are Evacuation General, or Secondly, Evacuation and Revulſion, or both that and derivation.

The places are appointed according to the ends or intentions of Curing by them, which chiefly are theſe three, *viz.* 1. A general Evacuation of humours from the whole body. 2. An Evacuation and alſo a revulſion from ſome particular member. 3. An Evacuation and alſo a derivation from ſome particular member. In reſpect of the firſt it is expedient that an Iſſue be made in the left arm; The ſecond Intention requires it far from the part affected, and the Third near the part.

For theſe ends, *viz.* one while for this, another while that or the other Fontinels are made in all parts of the Body, *viz.* in the Head, Breaſt, Abdomen, in the Arms and Thighs, and in moſt parts of each of theſe, either by Inciſion, or Cautery, or piercing through, and in their holes or orifices Peaſe, or wooden Peaſe, Pellets or Pledgets, are put to keep them open. We will obſerve the principal places and kinds of Iſſues by running through the members of our body.

1. *In the Coronal Suture.*

1. A Fontinel is preſcribed by ſome to be burnt by a Cautery in the Coronal Suture, and is commended for exhauſting and evacuating humours out of the brain and its outer Coverings. Although ſome uſe this in familiar practice, yet I have found by experience in ſome it doth leſs happily ſucceed, inſomuch that I have ordered many Iſſues to be ſtopt that have been made on the top of the head, being inſtructed herein from Reaſon and Experience; for that the blood transferres more feculency towards the place where it was wont to lay aſide its recrements, and depoſites them in the whole vicinage, and chiefly in the part affected, (as being the weaker and more ſuſceptible part) whence a Diſeaſe is oftner augmented than cured. For the ſame reaſon, *viz.* for the derivation of the humours from the inner head outwards, ſome form Iſſues in the fore-part of the Head over the ſagittal Suture, others in the hinder part of the Head about the beginning of the Lamboides, but the ſame exception remains againſt both as the former. And doubtleſs more rightly doth an Iſſue in the Arm anticipate the morbifick matter that is wont to be depoſited about the head, or makes revulſion in the Thigh, and raiſed a little beneath the head, derives from thence. For this reaſon in painfull diſtempers of the brain, and Meninges, we cut a deep hole in the Nape of the Neck in Children and Youths; but for thoſe grown up, and Old men, we apply Cauteries on either ſide the Spine between the Shoulders or the Homoplatas, and in the ſame places we make inciſion for two Fontinels capable of many Peaſe, often with very great ſucceſs. As to holes cut or burnt behind the Ears, or a Seton with a skane of Silk drawn through the Lobes thereof, I have ſeen them rarely with any ſucceſs, but often very troubleſome; Inaſmuch as a ſolution of Unity made in theſe places, neither diſcharges much Ichor, nor for any long ſpace; for though the hole or orifice be fill'd with a Peaſe, or Pill, it will be covered in ſpite of all endeavours to the contrary by the Cuticula, or skin growing under.

Iſſues in the fore and hinder part of the head.

Between the Shoulders.

which are profitable in many diſeaſes.

Iſſues in the back do notably help diſeaſes not only of the Head by Evacuation, and derivation of the morbific matter, but alſo in all Gouts, Stone and Colicks, by anticipating the fuel of the Diſeaſe, and by intercepting it while it tends to its ſeats: which really is plainly proved by experiments and obſervations taken from the help of the Patients.

Fontinels between the Shoulders, alſo in the Arm or Thigh, conduce to the evacuating or anticipating, in pectoral Diſeaſes, the humours flowing to the Lungs, and to the drawing back thoſe depoſited there. How an Iſſue cut in the Cheſt between the Ribs doth ſometimes more immediately derive the conſumptive matter from the Lungs, we have elſewhere ſhewed.

The

An Iſſue in the left Hypochondrion.

The Region of the Abdomen ſeems unapt for bearing an Iſſue in any part thereof; notwithſtanding the practice of ſome, although it be more rare, is much fam'd for a large Iſſue capable of many Peaſe to be burnt with a Cautery upon the Region of the Spleen for any hypochondriac affection. I have known it of ſmall benefit to ſome, at leaſt not recompenſing the trouble and pain of ſuch a remedy.

In the Groin.

Some time ſince I ſucceſſefully cured a weakneſs in the Loyns obſtinate to all other remedies, by a Fontinel in the Groin, and in another patient an inveterate Sciatica. For ſurely the glandulous Emunctories ſettled in that place, do imbibe very many recrements of the blood and nervous Juice; which if they be throughly and continually diſcharg'd from them by a fit vent, it will much conduce to exempt the contiguous parts from any morbifick Mine.

In the Thigh.

The Thigh being a member ſoft and large in bulk, ſeems apt enough for enduring many and great Iſſues, to wit, thoſe which may purge away plentiful humours from the whole body. Yet it doth not ſucceed ſo with many patients, partly becauſe of its figure too much declining, like a Cone invers'd, the Ligature containing the Peaſe in the orifice is not eaſily kept on, and partly becauſe a ſolution of the Unity being made among the concourſe of ſo many Tendons, it frequently becomes inflamed and painfull; inſomuch that ſometimes it hath been neceſſary that it ſhould immediately be ſtopt up, to withdraw the trouble of pain and of lameneſs. Notwithſtanding it ſucceeds better in ſome Patients, for that an inflammation doth not always enſue upon the place where the inciſion was made, and that the Ligature has remained immovable to thoſe that tye their hoſe above the knee.

A fit place in the member to be choſen that it may be made far from Veſſels and Tendons.

Moreover, as concerning Iſſues, it is requiſite to chooſe a convenient place not only in the body, but alſo in the very member where inciſion is made, which chiefly calls for the judgement of an expert Phyſician or Chirurgeon; for carefull proviſion muſt be made, leſt a Cautery or inciſion be made upon, or too near the Tendons or greater Veſſels; but let the Fontinel be made not in the very body of the muſcle, but in the interſpace or diſtance between the muſcles; where the orifice, as *John Heurnius* learnedly obſerves, ought to paſs through the whole skin ſo far, untill the little membrane of the muſcle underneath be penetrated. Wherefore, this part of Chirurgery is not raſhly to be allowed to Quacks and others ignorant of Anatomy, for that from this being ill done, not only a fruſtration of the benefit, but from thence frequently great miſchief happens, and ſometimes to the hazard of life.

Symptoms accidental to Iſſues how to be cured.

It is not needfull to deſcribe the figure and uſe of the cutting Inſtrument, together with the manner of preparing and compounding Cauſticks for making Iſſues, inaſmuch as it is notorious to the common people; yet it behoves us to handle in what manner the ſymptomes which happen to theſe Emiſſaries after they are made, may be cured, and it will not be beſides the matter to diſcourſe, what do either impede or pervert their powers.

What chiefly require help.

Whereas many and ſeveral diſtempers happen to Iſſues, help is not required for them all, but only for ſuch as are of greateſt moment: Wherefore there will be need of help, 1. Whereſoever an inflammation enſues upon the part or place where it is. 2. If the Orifice vent more or leſs Ichor than it ought. 3. If the Ulcer ſhall be apt ſpontaneouſly to be dryed up, and cover'd over with a skin: or if it be prone to abound with ſpongious fleſh growing about the ſides. As to leſſer faults, as when the Ulcer ſhall break forth into frequent Hæmorrhagies, or change its place creeping into another leſs convenient, with many other ways by which it prevaricates, it will not be worth our labour to diſcourſe here.

1. *Inflammation.*

1. An inflammation frequently happens to an iſſue, and that ſo painfull ſometimes, that it threatens a Sphacela, yea and ſometimes cauſes one. But ſuch an affection enſues either upon the orifice new made, or happens afterwards by reaſon of the blood and humours, occaſionally agitated and ruſhing frequently and in heaps to that part.

Which happens to a new Iſſue, the Reaſon of it and Cure propoſed.

When a Fontinel is made, immediately by reaſon of ſolution of the Unity, and conſequently by reaſon of the circuit of blood ſomewhat hindred in that place, a certain inflammation and ulcerous pain happens to ſome patients; but in ſome endued with a fervent blood, and whoſe Serum is leſs diluted, this enſues much fiercer. For the blood being brought thither by the Arteries, the ends viz. the Veſſels being cut off and obſtructed, it can neither go out nor be returned immediately by the Veins, but ſticking there in the paſſage it is accumulated more and more, and being at length extravaſated, and filling and ſtopping all the pores of the contiguous skin and fleſh,

fleſh, it raiſes a tumour with redneſs, and heat moſt intenſe, which coming to paſs, either the blood ſo heaped up, and extravaſated, in a ſhort ſpace of time becomes immovable by reaſon of conſtipation, and for that cauſe being as it were divided from the reſt of the maſs, it is extinguiſhed, and ſuffering death produces a Sphacela upon the part: Or ſecondly, the blood ſo ſtagnating, is after a ſort agitated as to its particles, and enjoying alwayes a vital flame, and made more intenſe by the ſame, it is as it were boyled throughly, and ſo is changed into a Pus, to be evacuated by an abſceſſe: Or, thirdly, which happens more frequently, and ought always to be procured in our caſe, the blood provoking an inflammation is reduced into the Veſſels and reſtored to Circulation by other paſſages whereinto it is conſtrained.

An Inflammation hath three manner of Criſis's.

But that it may be reduced, theſe two things will be neceſſarily requiſite: Firſt, That it be much diluted with the Serum flowing thither abundantly, or rather thruſt forward into the part: Then ſecondly, that the Veſſels behind the Tumour being emptyed, may ſwallow up the blood diluted, and driven back by the Serum; for the blood being forced towards the Tumour, whenas it cannot advance forward, yet its bulk being diminiſhed, that it may be able to return back, it diſchages the Serum plentifully from it ſelf, and drives it forwards into the places obſtructed; which entring under the ſtagnating blood, dilutes it, and ſucceeding into its places, forces it back into the paſſages of the Veſſels, and in the mean while that Serum tending forward exhales by the pores; inſomuch that the blood which was extravaſated being diluted and forced back by the Serum, and the Serum it ſelf evaporated, the ſwelling with the Inflammation vaniſhes leiſurely away. But if (as in more hot temperaments it comes often to paſs) the blood being extravaſated and impacted in the pores, be not diluted by the Serum brought to it in great plenty, it will not only ſtick there pertinaciouſly, but it will irritate a fiercer Phlogoſie with a Feaver, and ſometimes other dreadful ſymptomes. So, not long agoe, when a renowned Divine, endowed with a thicker and hot blood, had an Iſſue cut in the inſide of his Leg, although the skin only was cut, an inflammation followed preſently, which within a few days ſo cruelly encreaſed, that it could hardly be impeded by any Remedies from degenerating into a Gangrene. Wherefore, when the blood being extravaſated through the ſolution of the Union, and wanting the afflux of the Serum whereby it may be diluted and brought back, proceeds into an Inflammation, Fomentations and Cataplaſms of Emollients being outwardly adminiſtred, do often-times bring help; inaſmuch as the moiſt and ſoft particles falling from theſe, go under the blood ſtagnating, and dilute it, and ſo pleaſingly moving it together, cauſe it to return the more eaſily into the Veſſels; hence it is, that the moiſt applications of this kind being adminiſtred outwardly, do ſupply the defect of the intern Serum requiſite to dilute the blood; notwithſtanding that the blood being ſo diluted and irritated into motion, might be rendered fit for its Circulation, there is alſo need that the Veſſels which ſhould receive it ſhould be enough emptyed, for which purpoſe Phlebotomy and Purgation are frequently of neceſſary uſe, beſides a ſlender Diet. And indeed according to uſual cuſtom, we purge Cacochymicks or Plethoricks a little before, or after the Iſſue is made, and frequently breathe a vein in thoſe Patients. Neither are theſe Remedies only fit in an Iſſue new made, to provide againſt or diſcharge an Inflammation, but alſo they are advantageous as often as that diſtemper enſues upon an old Orifice of the skin. For as often as the blood being very impure, and together growing feaveriſhly hot, doth enter into a ſeparating turgeſcence, it frequently happens that it diſcharges its recrements and feculencies, otherwiſe unapt to be purged out, about the Fontinel, and there being impeded in its Circuit by them accumulated together, it is extravaſated, and for that cauſe brings on a fierce Phlogoſis. Such an affection not long ſince happening in a renowned ancient perſon, and being neglected from its commencing, within a ſhort ſpace of time degenerated into a Gangrene; notwithſtanding from which by the help of appropriated remedies carefully exhibited, as well inward as outward, he eſcaped not without great danger of life. At ſome other time hereafter perhaps, when treating of Cutaneous diſeaſes, we will ſpeak more largely of the Ætiologies and Remedies of an Inflammation, and of an Abſceſſe or Impoſtumation and Spachela. At the preſent we will conſider the other Symptomes of Fontinels.

The ordinary and beſt of theſe is, that the extravaſated blood may be reduced.

How it is done.

What Remedies there is need of.

For this end oftentimes purging and bleeding are required.

An Inflammation ſometimes happens to old Iſſues.

2. Whenever an Iſſue throws out too much Ichor, which for the moſt part is thin and very ſtinking, and ſometimes diſcoloured, ſo that the ſo vaſt loſs of humour, and that ſtinking, not to be endured, do require a Remedy; in ſuch a caſe there will be two

2. An Iſſue pouring out too much and ſtinking Ichor requires remedy.

Of which there are two Intentions.

two chief Therapeutick Intentions,*viz.* Firſt, that the mixture of blood be ſtrengthened, leſt its conſiſtence ſhould be too prone to diſſolution and ſerous efflux: Secondly, That the tone of the place ulcerated by the Fontinel be preſerved, and rendred exempt from any putredinal ferment, ſo that no taint being there lodged in ſecret, do impart any pollution on the blood paſſing through in Circulation, whereby it being infected, might preſently goe into parts, and the Serum be conſtrained there to diſcharge it ſelf more abundantly.

Firſt, that the Temperament of the blood be reſtored.

This former ſcope of Curing enjoyns ſcarce any thing but moderate purging by intermiſſion, and a regular Courſe of Diet, *viz.* that the Patient be reſtrained from all ſurfeit and exceſs, as to the plenty of Nouriſhment, the quality, and ſeaſons of receiving it; likewiſe more eſpecially from ſmall Wines, Cider and other acid liquors, whereby the blood is wont to be diſſolved into effluxes. For indeed thoſe that are ſo affected, do ſmartly pay for any error or irregularity in Diet, pain being immediately irritated about the Iſſue.

Secondly, to preſerve the tone of the part ulcerated.

For due preſervation of the tone of the place where the Iſſue is made, and exempting it from putrefaction, let ſedulous care be endeavoured, that all naſtineſs be declined, that both the ſolid things put into the orifice, as alſo the Coverings, whether Plaiſters or Leaves of Ivy, or Oyl cloaths, be changed twice every day; for in ſome perſons any of theſe will quickly contract a ſtench, and preſently cauſe the Ulcer of the Iſſue to putrifie. But if this tends to putrefaction, immediately in place of a Peaſe or wooden Pill, let a Pill of Virgins Wax be put in, incorporated with red Sanders and Verdigreaſe: Moreover, let a Fomentation withall, Morning and Evening, with the Decoction of St. *John*'s-Wort, Yarrow, Centaury, *&c.* be made uſe of.

Thirdly, a dry and troubleſome Iſſue requires help.

3. Sometimes a Fontinel like a dry Fountain pours out little or no humour; the reaſon whereof is uſually, either for that the orifice being not deep enough, doth not penetrate the whole skin, which is cured by piercing it deeper; or the Ulcer though hollow and large enough, yet remains always dry, becauſe the Serum doth not eaſily nor in plenty ſeparate from the maſs of blood, by reaſon of its conſiſtence being too much bound up; and then the only remedy is, to wear ſolid things within the Orifice, which may more provoke or twitch the mouths of the Veſſels, for which purpoſe Peaſe made of Ivy-wood, or Box, or of the roots of Gentian or Hermodactyls, are often uſed with ſucceſs.

An Iſſue ſometimes will heal up notwithſtanding all endeavours to the contrary.

4. It often happens, that the Orifice of an Iſſue being too ſhallow, and ſparingly ſweating out Ichor, is grown over with a thin skin with the Peaſe included therein, and the deep hole is healed up quite; for which fault there is ſcarce an apt remedy to be adminiſtred. Wherefore it is better to cloſe that Iſſue (rather than always in vain to fret the skin) or transfer it to ſome other place.

Sometimes it hath ſpongy fleſh growing about the lips.

5. The ſore of an Iſſue tending to healing, and being forbidden, often procures a ſpongious fleſh about the edges, and ſometimes in the hollowneſs it ſelf; the reaſon whereof is, becauſe the nutritious liquor being conveyed to the ends of the Arteries and nervous fibres, and being not immediately waſht away by the ſerous Ichor, fixes there, and beginning to be aſſimilated ſtretches out both theſe veſſels to fill the cavity with fleſh, and into theſe rudiments of fleſh both the blood and Animal ſpirits flow moſt copiouſly; and the blood in the mean time being conveyed thither, forms ſprigs of veins within that bulk for its return: Notwithſtanding this fleſh as yet rude and without ſhape, being excluded for the moſt part from the hole, grows up over the edge; and when in this manner it riſes higher than that it may poſſibly be covered and cloathed with skin and Cuticula, it remains always naked and ſpongious. This excreſcency is eaſily enough cured by ſprinkling thereon Eſcharotick powders, of burnt Alum, Colcothar, or Mercury precipitate; for remedies of this kind do eat away the fleſh ſo luxuriating by their acrimony as well as ſtipticknes, repel the nutritious humour, and lock up the mouths of the Veſſels. As often as that ſuperfluous fleſh encreaſes about the ſides of the Iſſue, it is a ſign that the nutritious humour flows thither more plentifully than the excrementitious; and for that cauſe in Patients ſo affected that vent proves not always ſo benign. Wherefore, under pretext of this reaſon many are averſe to that remedy (though ſurely it is harmleſs to moſt, although not alike uſefull and advantageous to all.) We have before conſidered the chief diſadvantages thereof, as likewiſe the ſcandals objected thereunto; yet there remains another thing according to the opinion or rather error of the Vulgar, a notable objection againſt Iſſues, which we will here diſcuſs for a Concluſion.

The reaſon thereof delivered.

With

With many in *England* a contumacious opinion is grown up (I know not whether it be ſo in other Countreys) That one or more Fontinels diſpoſe to barrenneſs. Wherefore this kind of remedy, however otherwiſe conducible to health, is ſcrupulouſly forbidden to all marryed Women that deſire Children; of which Prohibition there is no reaſon as yet made out, but only Stories related of certain Women that have been barren having Iſſues; when it were as eaſie to enumerate more barren women without Iſſues, and many others that have been fruitfull with them; and truly I uſe to retort (whenas there is no need of any other refuting) this as a chief Argument againſt that opinion.

The common error is that Iſſues diſpoſe to barrenneſs.

SECT. III. CHAP. V.

Of the Diſeaſes of the Skin, and of their Remedies.

AFter Attractive Remedies of the *Cuticula* and Skin, namely Iſſues and bliſtering Medicines delivered before, by a certain Law of Method we are induced to handle Diſeaſes of thoſe parts, and other kinds of Remedies of divers ſorts; the true Ætiology of which will afford matter of moſt pleaſant as well as profitable ſpeculation.

A Deſcription of the Cuticula.

As for the fabrick and uſes of thoſe parts, it needs not that I ſhould here repeat all things already accurately deſcribed, and well known in Books of Anatomy. It may ſuffice us to note concerning the *Cuticula*, that this outward skin is thin and denſe, without blood and without ſenſe, as deſtitute of Veſſels and Fibres, which cleaving to the inward skin, covers and defends it from outward injuries. This is every where full of pores, into whoſe orifices the Veſſels diſcharging ſweat do open, which *Malpighius* viewing more accurately with a Microſcope, a little before their gaping or opening, affirms to be endued with little Valves, for the retaining or free breathing forth of ſweat: but I confeſs they lye hid to me.

Of the Skin.

The *Cuticula* being taken away by Fire, or Phænigmons, the skin appears naked, and looks red, by reaſon of the ſanguiferous veſſels. But this is a thicker membrane, as to its greateſt parts, formed of filaments of Veſſels bringing blood, of Nerves, and of nervous Fibres, variouſly interwoven and complicated among themſelves, among which numerous Glandules and Lymphaducts, or Veſſels diſcharging Sweat and Vapours, are thickly interpoſed. The ſubſtance hereof is related to be double by moſt Anatomiſts, the outer is nervous, the inner fleſhy, or rather glandulous; for an example of which, the Rind of an Orange is brought. If the skin be viewed naked by a Microſcope, by the renowned *Malpighius*'s obſervations, Firſt there preſents it ſelf a body in form of a Net, in whoſe thick holes are contained not only paſſages of Sweat, but alſo very many Teats in form of a Pyramid, riſing out of the skin in parallel ranks, and paſſing into the *Cuticula*, where being ſtretcht out in length, they are divided as it were into many little Fibres; which the ſame Author hath determin'd to be the ſenſe of touching. Beſides theſe, the ſubſtance of the skin contains very many Glandules, by which means the Lympha or watery matter is carryed by the Lymphaducts or excretory Veſſels, out of the Arteries to the Pores. For indeed the moſt accurate *Stenon* hath obſerved, *that its Glandules lye under every pore*; which become either greater or leſſer, according to the uſe of ſweating: the ſweat or vapours continually ſtreaming out of theſe by the excretory veſſels, avoiding the excrements, do moiſten the nervous Teats in their paſſages, leſt perchance they ſhould grow dry.

The pyramidal Papillæ the Organ of feeling.

The Pores and Glandules of the Skin.

The Pores two-fold, greater and leſſer.

As to the pores or paſſages of Sweat, they are diſcovered by a Microſcope to be of two kinds, *viz.* The greater, in moſt of which the roots of the hairs are implanted, and by interſpaces, on both ſides of each wrinkle of the skin, are diſpoſed in a parallel rank: Or ſecondly, they are the leſſer Pores, which being numberleſs, do fill up all the ſpaces between the former in moſt thick Punctums or pricks. For indeed the whole skin with its wrinkles, appears like a Field furrowed by a Plow, and afterwards harrowed with the ranks turned, or rather oblique; ſo that its ground

The wrinkles and furrows of the Skin.

being eminent above the furrows of either kind, there remain in its plain, Figures very much of a Rhomboidal or a Diamond-faſhion; and accordingly as thoſe furrows, with their banks or flattes, are either ſhorter and leſs, or deeper and greater, the texture of the skin appears either delicate and thin, or thick and courſe. This kind of Conſtitution although it be moſt owing to ones birth, and to the primogenial growing together of the humours, is however manifoldly altered by reaſon of the various accidents of the enſuing life. A more groſs Diet, difficult labour, injury of Air, and chiefly exceſs either of heat or cold, render a skin more rough: alſo contrariwiſe a nice and delicate education renders its tone more fine and ſoft.

From whence the Roughneſs or Fineneſs of the skin.

Depends much on the Humours filling the pores.

That the skin may become more neat, ſmoothe and equal, it avails much that all its pores be filled with a benign, mild and unctuous humour; for ſo, whileſt all its pores become full, and extended, the level of the whole skin appears more ſmooth: Notwithſtanding, if a vicious humour furniſh thoſe pores, or the benign humour that was in them be too much exhauſted, for that cauſe the skin will become rough and full of wrinkles. Wherefore if any endowed with a moſt ſoft and even skin, ſhall wet their hands in a Soap Lather, Lie, or Lime-water, or alſo for ſome time in warm Blood, preſently the furrows and wrinkles will grow greater and deeper, the ſaline humour being drawn out by the other Salts out of the pores; wherefore more delicate women ſcrupulouſly decline waſhing with Soap or any other things that furrow the skin.

From the ſudden ſhutting up of the pores.

Neither only the humour being too much exhauſted out of the pores, but alſo retained in the ſame either unduely or above meaſure, doth render the skin rough and unequal. The hairy pores (which though they are not the only, yet are much the paſſages of Sweat) do conſtantly ſend out more plentiful Effluvia's for the ſake of tranſpiration, wherefore they ever ſeem greater and more open; but if it ſhall happen that theſe are ſuddenly obſtructed by any outward cold, the Vapours being reſtrained within, they do every where ſwell up the skin about the places where they break out, and lift it up into little heaps: from hence if at any time our bodies are expoſed naked to the Northern wind, or are plunged in a River, the exterior Superficies before ſmooth and ſoft, will become rough and rugged, like the skin of a a Gooſe new pull'd. Without doubt thoſe greater pores, being, according to the furrows of the skin, planted parallel and as it were in a rank after the manner of a *Quincunx* or exact Square, are made as ſo many pitts for the planting of hairs as it were trees; for ſo they appear in four-footed Beaſts, and in ſome hairy parts of men.

In the larger pores are the roots of the hairs.

Theſe things being thus briefly declared concerning the *Cuticula* and Skin, as touching their frame and uſes, there is way enough made to ſearch and unfold the Diſeaſes of the ſame parts, and the reaſons of healing them.

No Diſeaſes of the Scarſ-skin.

Wherefore firſt ſcarce any Diſeaſes properly belong to the *Cuticula*, it being devoid of life and ſenſe. This ſometimes being too thick hinders Tranſpiration, and alſo ſometimes by reaſon of accidents in ſome places it grows too thick and callous: but it ſelf being clearly unſenſible it is never ſick, notwithſtanding this is a cauſe that ſome diſtempers which might be blown off by Tranſpiration, do cleave to the ſuperficies of the skin, inaſmuch as the dregs of the blood, and humours, and recrements being thruſt forward outwards, having paſſed through the whole skin, when they cannot evaporate wholly by reaſon of the thickneſs of the Scarf-skin, being faſtened in the outer skin, produce various diſcolourations, and ſtains thereof; of which ſort are thoſe ſpots called Heat-ſpots, Freckles, or Ephelides, as alſo ſcorbutical and malignant ſpots, alſo Pimples and whatſoever other ſtains without any ſwellings or roughneſs do ſeem to beſprinkle the skin or outward Scarf-skin, with marks, or ſome little disfigurings.

The cauſe of ſome.

The Cutaneous diſtempers reckoned up.

But truly as to what belongs to the diſtempers of the Skin it ſelf in general, ſince they are various and manifold, they are wont to be diſtinguiſhed under a various reſpect, and chiefly that they are either with or without a Tumour; we have but now taken notice of theſe latter ones.

Diſtempers in the skin with or without a tumour.

Diſtempers of the Skin with a Tumour, are either univerſal, diſperſed throughout the whole body; or are particular, being raiſed in theſe or thoſe members, diſperſed or as it were by chance.

The former either happen upon a Feaver, as chiefly the Small-pox, Meaſles, or other malignant wheals, whereto alſo may be added the fleeting puſhes of Infants; or happening without a feaver, as the Itch, Tetters, and leprous diſtempers.

The

The outward particular Tumours, or diſperſed ones, for the moſt part do not ſeize upon the skin only, but alſo upon the parts ſubjected, *viz.* now the carneous, another while the tendinous, or membranous or glandulous, and for that cauſe do exiſt of a ſundry diſpoſition, and of a diverſe form. To diſcourſe particularly concerning all theſe, and to aſſign the reaſons of their Cauſes, and Cure of every one, would be a matter not only of an entire Tract, but of a great Volume: Wherefore, for the preſent we will only briefly ſpeak of the Diſtempers merely or for the moſt part Cutaneous (of which ſort are all ſpots and Pimples, as alſo the Scab, or Itch, Tetters, or leprous Maladies): perhaps, an opportunity may happen, when I may treat more ſpecially of Tumours of every kind.

1. Spots call'd Ephelides.

The deſcription of the Ephelides.

Firſt then (that we may begin with Spots as Affections of leſſer moment) thoſe offer themſelves called *Ephelides*, becauſe they are chiefly cauſed from the Suns heat; for that cauſe frequent in the Spring, and increaſe moſt in Summer, again in Winter they ſoon vaniſh. Moreover, whereas they happen in the more beautifull perſons, and of a thinner skin, they break out chiefly in thoſe places where the *Cuticula* is moſt thick, and is expoſed to the Sun and Air, *viz.* the face and hands, of a colour yellowiſh or brown, in magnitude of a Flea-bite, but they exiſt unequal and irregular as to their Figure. Theſe differ little or nothing from thoſe browniſh or yellowiſh ſpots which ſome call Lentigines or Freckles, which conſiſting of the bigneſs of a Lentil, mark the parts of the face as it were with many drops.

The matter and cauſe thereof.

The matter of theſe ſeems to be a more thin portion of the cholerick humour, allured outwards by the force of the Sun attenuating it, and opening the pores of the skin; which beginning to be evaporated, is fixt to the inſide of the outmoſt skin or *Cuticula*, which it cannot paſs through. Surely it is a ſign theſe ſpots proceed from Choler, or other yellow ſcums of the blood, becauſe they are chiefly familiar to them whoſe hair is yellow. Moreover, the reaſon is manifeſt enough, becauſe they ariſe more often in a fair Complexion, and in thoſe parts expoſed to the Sun and Air; for their more thin skin tranſmits the humour rarified by the ſolar heat ſo far untill it is retained by the thicker Scarf-skin, near the places of iſſuing out. This affection preſages or indicates no evil, as to the ſtate of health; and although in appearance it repreſents ſomething of deformity, notwithſtanding that is made good again, inſomuch that it ſignifies them ſo ſpotted, to be endued with a more pure Conſtitution.

Lenticular Spots.

Beſides theſe ſmall freckly ſpots there are others much larger, above a hands breadth in magnitude, which deform the skin in divers places, eſpecially about the breaſt and back, one while with brown, another while with pale or blackiſh ſpots. Theſe at certain times, as I have obſerved in many, being wont to ariſe in certain parts and vaniſh again, are commonly called Liver-ſpots, and thoſe moſt markt with them are thought to have a Liver leſs ſound, or at leaſt not well ſanguifying; which notwithſtanding is not true on this account, but only inaſmuch as the cholerick humours, when they are not enough ſeparated from the maſs of blood within the Liver, being thruſt forward to the skin do ſo diſcolour it: which fault alſo is imputed to the Spleen; for truly this deformity ariſes, becauſe that the feculencies and excrements of the blood, when not enough received by the Veſſels of ſeparation, are together diluted with the Serum, with which they are conveyed to the skin, and in the ſame place being caſt off by the blood, and deſerted by the ſerous Juice while it is evaporating, they are faſtened about the outer little holes or pores, even as a moſſie down cleaving to the ſtrait places of a River.

Liver Spots falſly ſo called.

The Deſcription and Cauſe of them.

Theſe ſpots chiefly appear in Summer, and moſt upon the Breaſt and Back, *viz.* at which time and in thoſe places men are moſt apt to ſweat: for that ſerous Juice which brought out thoſe dregs from the maſs of blood, into the ſtrait places of the skin, leaves them there, altogether unable to evaporate. This indiſpoſition hath nothing of evil joyned to it, nor is it a ſymptom of any preſent diſeaſe, nor doth it preſage any ſuddenly approaching; Moreover, when for the moſt part it happens to places that are covered, and brings no deformity or trouble, there ſeems little or no need of Cure: but becauſe an opinion is frequent with the Vulgar, that the Liver is eminently endangered by theſe ſpots, and neceſſarily requires Medicine, for this cauſe to ſatisfie the importunate, craving Medicines, we are wont to preſcribe, beſides extern Coſmeticks, even inward hepatical Remedies; whoſe uſe although not very neceſſary, yet becauſe from thence the depuration of blood, and opening obſtructions of the bowels are diſpatcht, they are not altogether in vain. The inward Medi-

cines profitable to this deſign, are deſcribed before among the hepatical Remedies: The Topical or outward are altogether the ſame in theſe as in any other kind of ſpots; ſome ſelect forms of which we will annex.

Peſtilential and ſcorbutick ſpots. Concerning Peſtilential, as alſo Scorbutical ſpots, of which we have purpoſely in another place ſpoken, there is no need here to repeat the ſame; eſpecially becauſe for theſe another method is required, than for thoſe but now deſcribed; inaſmuch that in one kind of ſpots, Medicines for the moſt part outward are wont to be adminiſtred, without Splanchnic or Cordial medicines, but in the other kinds only inward medicines, without any that have reference to the Skin.

The Cure of the Spots. Wherefore, as to the ſpots called Freckles, Lentigines, and thoſe commonly called Hepatical, they properly belong to the Art of Beautifying; and for the taking away theſe Deformities of the Skin, only Coſmetick Remedies are preſcribed, without any method of healing. There is every where a plentiful harveſt of theſe with curious Ladies, and others, that are ſolicitous of cleanſing their skins; yet all theſe, foraſmuch as they only reſpect two Intentions of healing, may be reduced to theſe two heads; *viz.* either by opening the pores of the skin and Scarf-skin, and ſometimes by excoriating this, they do endeavour to have the humour drawn outward, and alſo to be evaporated; or on the other ſide, and not with leſs ſucceſs, thoſe things are adminiſtred that may drive back the ſpotty matter, and force it inwards. We will annex here in order ſome uſual Forms of the Topicks of either ſort, being rationally found out, and frequently made uſe of happily enough; becauſe it is not lawful without offence of the Great Ones to detect the more ſecret myſteries of the Coſmetick Art, and to profane it among the Vulgar.

Forms of Coſmeticks.

1. which cleanſe the skin. Firſt therefore for cleanſing the skin, and drawing forth the matter of Spots:

Take of a ſmall ly of Salt of Tartar four ounces, Oyl of bitter Almonds made by expreſſion, as much as ſuffices, in ſuch a proportion let it be mingled, that the liquor turn preſently white, and ſo remain; with this mixture let the parts be anointed morning and evening, and gently chafed.

Take of Aron-roots, Bryony, Solomons-Seal, of each one ounce, Powder of Fenugreek-ſeeds one dram, of Camphir half a dram, theſe being beat together, pour on them three ounces of Oyl of Tartar per deliquium, *let it be preſſed and applyed with a rag twice a day.*

Take of quick Brimſtone in powder one ounce, black Soap two ounces, tye them in a rag, and hang them in a pinte of Vinegar for nine dayes; after let it be uſed by waſhing the part twice a day, and chafing it.

2. which repell the ſpotty matter. Secondly, For the other intention of diſcuſſing the ſpots from the skin, and repelling their matter inwards, *Lac Virginis* was a renowned Remedy among the Ancients, and is as yet commended and made uſe of by many: The Preparations are well enough known, *Viz. A Solution of Litharge made in diſtilled Vinegar, by pouring of Oyl of Tartar* per deliquium, *it is precipitated into a white liquor like milk, with which let the face and hands be waſhed twice a day, and gently chaf'd. A remedy like this or of the ſame vertue is prepared out of the ſolution of red Lead or Ceruſe made in the ſame Menſtruum, and precipitated with Alum Water, or a Solution of Sal Gem. Or,*

Lac Virginis.

Take of Camphir ſliced two drams bruiſed in a glaſs Mortar, pour thereon leiſurely the juice of one Lemmon, then adde one pint of White-wine, ſtrain it, and let the remaining Camphir tyed in a rag be hung in the Glaſs.

Take Verdigrieſe four Ounces, pour thereon two pints of White-wine Vinegar, being put into a Cucurbite-glaſs, let them be diſtilled in Sand, let the Phlegme be kept for uſe, with which let the face be anointed twice a day.

For this purpoſe alſo the Phlegme of Vitriol doth notably conduce. It ſuffices ſome to uſe the diſtilled ſimple water of Bean-flowers, or of Fumitory, or the liquor of a Vine diſtilling from the Boughs cut in the Spring-time. Notwithſtanding the more nice, and thoſe who chiefly boaſt to underſtand this Art, are ſcarce content with any Remedies but Mercurial, wherefore the following water is commended and ſold by Empiricks at a great rate againſt all foulneſs of the face whatſoever.

Take

Take of Mercury ſublimate one ounce powdered, put it in a Tin Veſſel with three pints of Spring-water, let them ſtand twenty four hours ſpace, ever and anon ſtirring it with a wooden Spatula untill the whole liquor grows black, which notwithſtanding being philter'd through brown Paper, becomes clear; with a rag or a feather dipt in this, let the face be gently done over once or twice in a day. *A Mercurial Coſmetick water.*

This Remedy doth moſt notably help againſt all cutaneous Deformities, *viz.* inaſmuch as it drives away the humours within the little pores, and thoſe impacted within the little holes howſoever ſmall, diſſolves the inveterate and ſtubborn combination of Salts or Sulphurs, and reſtores the whole skin, (where it is applyed) though evilly framed as to its pores, and makes it well coloured. Wherefore it is uſefull not only to cleanſe the ſpots of the face, but alſo to take away wheals and its redneſs, as alſo the Diſeaſe of the Eriſypelas. Moreover, ſometimes it happens that many parts of the face, eſpecially the Noſe and Forehead, are markt with moſt thick Specks looking black, as if burnt by Gunpowder, which proceeds from hence, becauſe the ſudatory pores are ſometimes fill'd with a more thick black humour, another while with little worms with black heads (which little Inſects being ſqueezed out of the pores, and expoſed to the Sun, are eaſily ſeen to live, and to move themſelves) and in ſuch a malady of the skin, no Lotion or Oyntments are wont to profit, but what are Mercurial; notwithſtanding to this Hony there is a Thorn at hand more than enough malignant. For the particles of the Mercury together with its Salts (by which they are divided and ſharpened into ſmall bits) being applyed to the face, do ſhake off the peccant and uncleanly matter out of the Pores, and expell it thence, but having driven it back, they purſue it in, and readily inſinuate with the Blood and nervous Liquor, whoſe temperaments they prejudice. Yea by meeting with theſe they imprint very often on the Brain and ſometimes on the Præcordia and other parts, their virulency that can never be wiped out. From hence it is frequently obſerved, that women or men that have long uſed Mercurial Coſmeticks, are troubled with a Vertigo, and convulſive Diſtempers, or are obnoxious to paralytical, and their Teeth grow black, and ſometimes fall out.

Its Vertue.

Its familiar uſe is not ſafe.

SECT. III. CHAP. VI.

Of the Mange or Scab with the Itch.

After the more ſimple maladies of the skin, *viz.* thoſe which happen without any Tumour and Ulceration, and only deform it with ſpotted appearances, we will now in order treat of the more grievous Affections, and thoſe which diſſolve the Unity, and eſpecially of the Pſora or Scab, which in ſundry and frequent places of the whole Body doth much infeſt the skin with a painful Itch, and with ſmall Puſtles and breakings out, being ſometimes dry and often ſcaly, and another while moiſt and diſpoſed to ulceration; and a malady of this ſort is moſt properly the Diſeaſe of that part, conſidering it frequently begins in the very skin by reaſon of ſome outward Contagion, and often receives Cure by certain Remedies applyed to the skin only, at leaſt the reaſon of both holds ſo far, that it is ſeldom otherwiſe undertook or perfectly cured.

Pſora a diſeaſe properly cutaneous.

The Pſora or Scab is vulgarly deſcribed to be a breaking out of Puſtules and wheals throughout the whole body, here and there, procured from a ſharp and ſalt humour heaped up in the Pores of the skin, and that it may be diſcuſſed from thence, induces a notable Itch, and a neceſſity of ſcratching.

Its deſcription.

That we may ſearch duly into the cauſes of this Diſeaſe, and the reaſon of the ſymptoms, we will more deeply enquire concerning the matter effecting and the conjunct cauſe thereof, that it may certainly be known of what ſort that humour is which is heaped up within the skin, by what means it is either generated there, or comes from ſome other parts, afterwards in what pores or little places it is contained, and how endeavouring to break out, it doth create ſo troubleſom an Itch.

Where-

What humour its matter is of.

Not any of the four common humours.

But a humour plac'd in the Glandules of the skin.

Wherefore about the origine of this Diſeaſe, that we may not impute the fault with the Ancients to the Liver or Spleen, the matter thereof is not any particular humour of the four commonly ſuppoſed ones, not Phlegme, nor yellow Choler, nor black, neither alſo the blood apt of it ſelf to be extravaſated; moreover neither doth it ſeem to conſiſt of two or more of theſe humours mixt together. For though ſuch humours be granted, notwithſtanding if this Diſeaſe always conſiſt of them, it would not ſo eaſily be catch'd by a meer and light contagion, or receive Cure by an Oyntment alone. Wherefore it is rather to be ſuppoſed, that the morbific matter is the humour of the Lympha conſtantly reſting in the glandules of the skin; notwithſtanding degenerating from its genuine diſpoſition, that is to ſay, its volatile-ſalt, into an acid or otherwiſe offending diſpoſition. For when the continual Supplements from the blood come to this ſo depraved, and unceſſantly evaporating, theſe Juices new and old do not eaſily agree, or are united, but boyling together after the mutual cuſtom of diſſimilar Salts, they are coagulated into a recrementitious matter, which filling and diſtending the pores of the skin, every where raiſes it into Tumours; Moreover it ſomething hinders the Blood in its paſſage, and conſtrains it to be extravaſated. From hence thick Puſtules are raiſed, and becauſe that matter paſſing into an Ichor is compelled by the Serum and Blood purſuing it ſtill forward, they riſe up into little heaps; afterwards the Animal Spirits entring inordinately into the nervous Fibres, that they may promote the throwing off that ichor, do cauſe the ſenſe of that troubleſome itch.

The deſcription of that Juice or Humour.

Indeed an inſpection with a Microſcope doth moſt clearly diſcover that there is a lymphous humour in the glandules of the skin which lye under all the ſweating pores, treaſured up for ſome uſes, ſo that according to the plenty and diverſe ſtay thereof, theſe Glandules exiſt more or leſs turgid. This Juice is laid aſide by the Blood, through the Arteries, in theſe Glandules, that this little burthen being caſt off, it might return more eaſily through the veins; in the mean time being repoſed there, it hath its uſes, *viz.* In the firſt place continually moiſtening the miliarie Teats, which lying under the nervous little Fibres, are the proper Senſory of Touching, it preſerves them from dryneſs, which would hinder the Senſe; alſo it imbues the aduſt effluvia's paſſing unceſſantly from the blood being kindled, in their paſſage near the skin, with a certain moiſture, and renders them fit to be voided by the pores; and whileſt part of this humour doth ſo continually evaporate with the Effluviums of the blood, thoſe expenſes are repaired by the Lympha continually freſh, being depoſited by the Arterial blood as is aboveſaid.

How it degenerates.

Notwithſtanding this œconomy of the Region of the skin is not always ſo regularly kept, but that the glandulous humour falling from its own diſpoſition and function, not only will provoke in the skin, but ſometimes in the whole body, preternatural affections of divers ſorts. This growing clammy, and cleaving more obſtinately in the little Cells obſtructs tranſpiration; and immoderate ſweating proceeds from its too plentifully flowing out, and from the ſame reſtagnating inwards, a more than uſual Diureſis. Moreover, as to what belongs to the Scab and puſtulous eruptions,

This is done three ways.

that humour as it is wont to be depraved many ways, ſo chiefly theſe three, and is wont to enter into a coagulative diſpoſition with the Serum, being freſh poured out from

1. *By reaſon of impure Blood.*

the blood. *viz.* Firſt the Blood it ſelf being very impure, and alſo diſſolved, it leaves its corruptions and ſuperfluous droſs in the cutaneous Glandules, which in the ſame place putting on the nature of more corrupted ferment, they boyl up with other adventitious Juices, or paſſing by theſe, and are diverſly thickened, and ſo they beget not only puſtulous affections, but alſo leprous of divers kinds. From hence the daily and often eating of Shell-fiſh, and alſo of others; and of ſalted meats that have been hung in the Sun or Smoak; alſo the taking diſagreeing Drinks, and venemous Medicines, do cauſe cutaneous and frequently dreadful eruptions.

2. *By mere ſtagnation.*

Secondly, The humour being heaped within the cutaneous Glandules, ſometimes doth not only become puſtulous by a mere ſtagnation, but alſo frequently Louſie. Wherefore, not only they that have been long in priſon, but alſo thoſe who being of a ſedentary life, are uſed to naſtineſs and ſluttiſhneſs, do live obnoxious to the above-mentioned maladies; inaſmuch as the cutaneous humour being not at all eventilated, is corrupted by mere ſtanding, after the manner of putrefying water, and ſo it puts on the diſpoſition of a corrupting ferment; to which moreover Supplements of putrefraction come from the blood in the like manner depraved.

3. *By Contagion received from without.*

Thirdly, If perhaps theſe Canſes are wanting, that the glandulous humour of the skin,

skin, neither contracts any ſtain from fault of the blood, nor its own proper ſtagnation, notwithſtanding virulent ſteams communicated from without, render it no leſs prolific as to thoſe diſeaſes. This is manifeſt by common obſervation eſpecially, foraſmuch as they that have health moſt, and are endowed with the beſt Conſtitutions, ſcarce ever eſcape free from the ſame, if they lye in the ſame Bed either with a ſcabby perſon, or where he hath lately lain: and not only ſo, but moreover the Linnen of the Scabby, oftentimes waſhed with other Linnen have beſtowed the contagion upon others. Surely, the taint of no diſeaſe (the Plague only excepted) is more eaſily or certainly propagated than this of the Mange.

The reaſon of its moſt ſudden contagion is unfolded.

If the reaſon of this be enquired into, we preſently ſay that the liquour ſuſceptive of the ſcabby taint is mightily expoſed, and moſt eaſily diſpoſed unto it; and indeed much more ready to either, than the Blood or Nervous Juice. For the glandulous humour of the skin abounding in the outer ſuperficies of the body, firſt imbibes every atome let in by holes and pores every where open, and anticipates them from the blood. Moreover, that this is ſo ſoon infected with a ſcabby Contagion, both the activity of the ferment communicated cauſes it, and alſo the proneneſs of the glandulous liquor to degenerate. For indeed the effluvia's falling from the breaking out of the ſcabby skin, are aptly enough compared to the Yeſt of Ale, remaining on the top as it were its outmoſt Coat; of which if the leaſt portion be taken from thence, and mixed with other new Ale unfermented, preſently it ferments the whole maſs how great ſoever, and changes it into the diſpoſition of the liquor from whence it was taken. Certainly there is a very conſiderable energy, which the particles however ſo ſmall and little, carryed to the higheſt activity, are able to perform; but eſpecially if they fall into a liquor (of which ſort is the cutaneous) made up together of ſubtile particles of ſeveral ſorts, as well partaking of the blood, as of the nervous Juice, and for that cauſe moſt readily apt to be fermented. Whereſoever therefore theſe effluvia's of the Contagion aboveſaid hit againſt any outward part of a healthful body, firſt they will infect the cutaneous humour only planted in that place, but then the particles of this ſo corrupted, being received by the venous blood, and preſently delivered to the Arteries, are diffuſed through the entire habit of the body, and in a ſhort time defile the whole maſs of this Humour, and make it ſcabby.

The Contagion when any where received, preſently ſpreads over the whole skin.

Of the Itch.

From theſe Cauſes of a Pſora as well adjunct as procuring being unfolded, the reaſon of the firſt ſymptoms, or breaking out in Puſtules, is manifeſt enough; but as to the other, *viz.* the Itch, as it is troubleſome to Senſe, that the formal reaſon thereof may be known, we ought to conſider to what Senſory or organ of ſenſe it properly belongs, and of what ſort its paſſion or affection ſhould be.

It belongs to the Senſe of Feeling.

Concerning theſe things, firſt it is ſure it belongs to the ſenſe of touching, and that the firſt Inſtruments hereof are Teats faſhioned like a Millet, and their little Fibres diſperſed through the whole skin, as we have before declared. Moreover with this ſenſe all the nervous fibres are endowed, being diffuſed throughout the whole body. Notwithſtanding, whereas there are two ſupream paſſions of Touching, and as it were generical, *viz.* *Pain* and *Pleaſure*, it is deſervedly doubted to which of theſe Itching ought to be related. For the ſolution of which, we ought to ſhew by what means the Animal Spirits, being inmates to the organ of Touch, are affected in Pain, and alſo after what manner in Pleaſure; then their demeanour alſo as to the Itching being deſign'd, it will eaſily be manifeſt of what Province this Paſſion is, and in what things the nature of it, and the manner of its acting do conſiſt. Let the Reader pardon me, if I ſhould by way of digreſſion expound this more at large, and even to tedioufneſs, becauſe this Ætiology ſeems very neceſſary both to the underſtanding and curing of moſt outward diſtempers. Pain being diſtinct from Sadneſs, and belonging to the Touch, is uſed to be defined, *A troubleſome feeling proceeding from the diſſolution of Unity*. And indeed it takes its origine as often, and in as much as any ſenſible thing, diſagreeable or improportionate, being applyed to that organ of ſenſe, divides and ſeparates the fibres one from the other; and for that cauſe repelling the animal ſpirits inhabiting in them, from their wonted and quiet emanation, diſtracts them from one another, and as it were puts them to flight; then preſently foraſmuch as that outward repulſe of the ſpirits, is communicated by a continued order of other ſpirits, to the firſt organ of Senſe, it ſtirres up the Spirits dwelling there into the like confuſions, ſo a perception is cauſed of grief or pain inflicted outwardly. In truth the whole ſeries of animal ſpirits which are affected with pain, as it were ſome ſingular member of the ſenſitive Soul, conceiving trouble, as it were, from

Of what ſort its Affection is.

The chief Affections of feeling are Pain and Pleaſure.

The formal reaſon of Pain.

from the impression of the object, is forced to be wrinkled with pain, and to contract it self into a lesser dimension.

The Solution of the Unity always the cause of it.

When a dissolution of Unity is said to be the cause of pain, we must not understand it so as if this affection only were caused from a wound or blow inflicted upon the body, for the same thing is used to be induced from cold, heat, wind, from the extravasating of the blood and of other humours, or their being heaped up together in several places, oftentimes the fashioning of the member remaining as yet entire; in which cases, although the continued parts, and chiefly the fibres and filaments, are not at all cut off, notwithstanding they are in every Affection of grief pulled from their usual position, either by the oppression of the object, or by strange particles forced like wedges, and are compelled into too much tension or distorsion, or divulsion; and for that cause the inmate spirits being pulled from their mutual embraces, and dissipated, are ill at ease, and incur the passion of pain or grief.

What Pleasure is.

Pleasure is opposed to Pain, and is a manner of Feeling clearly contrary thereunto; which takes its origine, inasmuch as a pleasant stroaking being made upon the organ of Sense, the spirits flock thither, and presently being thickly gathered together, and overspread with a certain delight, they do as it were exult and rejoyce together in the organ: afterwards, inasmuch as the spirits enter into the like triumph or rejoycing within the *Corpus striatum*, a perception of pleasure is stirred up.

Its formal Reason.

It chiefly consists in removing of Pain.

The greatest pleasure which is offered to the Touch, consists in this, that the cause of Pain being removed, the parts formerly affected by it, may recover their wonted temper and frame; for so the animal spirits being before put to flight, and dispersed from one another, they recollect themselves, and rushing into the places from which they were banished with reinforced strength, they prepare themselves to rejoyce. From hence the Peripateticks placed the formal reason of Pleasure only in the removal of something that was troublesome, as when the excesse of cold or heat is received by an opposite and more agreeable state. Indeed the tangible object (because it is alwayes thick and dull) doth scarce any way else (excepting Venery) allure the animal spirits into heaps to the organ of Sense, unless for that it removes their former confusion.

What the Itch is.

From these things so described concerning those passions, it is easily manifest, that the Itch according to the formal account thereof, is neither perfectly nor fully either Pain or Pleasure, but imperfectly and as beginning, partakes of both. For really the scabby matter being heaped up within the pores of the skin, and making the solution of Unity in many places, enclines towards pain: yet as it is volatile, moving, and hastens towards vent, for that cause the Animal spirits are not put to flight from the Fibres although pulled asunder, neither are they driven back with sense of pain; but the contrary, as if being stronger than the humour infesting, they were able to cast it forth, they being wrapp'd up more thick, but irregularly within the cutaneous fibres, do twitch them together variously, and draw them on, that they may the sooner discharge the morbific matter, and expell it forth. Wherefore inasmuch as the Animal spirits being neither put to flight, nor repulsed, but flowing together in crouds into the organs of Touching, they manage themselves there tumultuously, and disorderly, and as it were by tickling the sensible fibres do provoke them into small Convulsions, no pleasure, but a troublesom feeling, nor also is it Pain, but a Passion clearly diverse arises from it. But as soon as by rubbing or scratching, the plenty of Spirits assembled about the organ of Sense, begin to be better disposed, and as it were reduced into order, from thence a thorough feeling of Pleasure is introduced. Wherefore the Itching seems to be a middle-state between the beginning of Pain and Pleasure, or a passage of the Spirits from the rudiments of that, towards the full compleating of this. But from this Physical discourse by the by, let us return to our Pathologie or discourse of the distemper. From what is above said it is easie to collect the differences of this disease.

How the Spirits are moved in it.

A certain medium between Pain and Pleasure.

The difference of the Psora as to its origine.

In the first place therefore the Psora as to its origine either is got by Contagion, or by reason of an ill Course of Diet, the fierceness and supply thereof is communicated by the Chyle and Blood being vitiated, or it is generated in the skin it self, by reason of filth, and the defect of Transpiration: Whereto we may adde, that sometimes Infants acquire this taint hereditarily contracted from their Parents.

Secondly,

Secondly, Theſe cutaneous Eruptions as to their form, vary according to the diverſe Conſtitutions of the perſons affected: for in ſome perſons of a cholerick dryer Temperament, or Melancholy, only a dry Scab is ſtirred up, and inaſmuch as it evaporates leſsby reaſon of the defect of the Serum, with an Itching not altogether ſo troubleſome; but in others of a moiſter Temperament, and of more unclean blood, very many wheals and puſtules imbued with Ichor, and moſt of all itching, do very much provoke to ſcratching, and by reaſon of the Ulcers ſtirred up therewith, the Itch is immediately altered into pain. *2. As to its form.*

As to the Prognoſticks, although this Diſeaſe is never of it ſelf mortal or very dangerous, and always eaſie of Cure: yet frequently it contains an evil event; inaſmuch as being long continued, it utterly depraves the blood and nervous Juice, and from it haſtily cured, by reaſon of the matter received within, while it is diſcuſs'd from the Pores, a pernicious taint is brought upon the Præcordia, and Brain, and other noble parts. *The Prognoſticks of it.*

The greateſt hazard from a Scab, threatens Children and Cachectick perſons; as in both of which the taint is more eaſily impreſſed from this Cutaneous humour upon the nobler parts, which afterwards when the outward malady is removed, remaining within cannot be vanquiſhed entirely, but by a very long Courſe of Phyſick, of which neither is capable nor patient; wherefore, ſuch perſons, all care and diligence being adminiſtred, ought to be preſerved from the infection of the Scab as from the Plague. *Moſt dangerous to Children and ill juiced or cachectick perſons.* *Its Cure.*

Concerning the Cure of a Scab or Pſora, two chief Indications preſent themſelves, and each of them two-fold, *viz.* The firſt intention Curatory reſpects theſe two things, Firſt, that the glandulous Humour (its corruptive ferment being wholly extinct) may be reduced to a due temper. Secondly, afterwards that the pores and paſſages of the skin being freed from thoſe Ichorous congealings, may recover their priſtine frame or good temper. *The firſt Indication curatory.*

The Second Indication Preſervatory takes care to prevent theſe two things, *viz.* Firſt, leſt the impurity of the Pſora, or corrupting Miaſma's of the skin, being diſcuſs'd from the skin (while the ferment is expugned) turn back again into the blood and nervous liquor, and bring upon them not only ill temperaments, but alſo (as frequently it uſes to doe) a more conſiderable prejudice upon the Brain or Præcordia. Secondly, alſo let it be endeavoured that the taint of the Humours, and of the noble parts contracted from the Itchy matter, may be eradicated while the faults of the skin are repaired. *The ſecond Indication preſervatory.*

All theſe intentions of Curing, by remedies internal as well as external together, being much and often uſed, ought to be joyn'd together, or at leaſt-wiſe to be interus'd, *viz.* that the morbific matter being diſcuſſed from its receſſes, may not depart into and lye hid in any lurking-places any where elſe, but from every part, inwardly and outwardly, by remedies taken, may be wholly removed away; wherefore Purgatories ought alwayes to begin and end this method of Curing. Although *Helmont* with great pomp overthrows this Cathartick method of Phyſick, and as it were leads it in Triumph, becauſe it doth not cure the Scab by it ſelf, yet we may affirm this Diſeaſe without that remedy can ſcarce ever eaſily be cured, but never ſafely. Moreover Phlebotomy, unleſs ſomething contradict it, is preſently to be celebrated in the beginning; upon theſe, Alteratives that cleanſe the blood and ſtrengthen the bowels, and defend againſt the aſſaults of the morbific matter, challenge their turns; and in the mean time Liniments, or Baths, or topical remedies of another kind, and properly Cutaneous, are adminiſtred: As without which not only Purging and Bleeding, but alſo Diaphoreticks, Diureticks, yea whatſoever remedyes evacuating blood or humours, or altering them, become uſeleſs. We will annex ſome more ſelect ſhort forms of Medicaments, of every one of theſe Kinds but now recited. And firſt for the due undertaking of the Purging part, let there be adminiſtred in the beginning a purging Medicine or a Vomit; alſo after Phlebotomy being uſed (if need require) an Apozeme or purging Ale may be adminiſtred for ſeven or eight dayes. *Both inward and outward Medicines are to be taken together.* *Purges, Bleeding and Alteratives, and afterwards Topicks are required.*

Take of Electuary Diacarthamus three drams, Spec. Diaturbith with Rhubarb one dram, Cream of Tartar, Salt of Wormwood an. half a ſcruple, ſyrup of purging Apples what ſuffices, make a Bolus to be taken with Government. Or, Forms of Purgers.

Take Sulphur of Antimony ſeven grains, Scammony ſulphurated eight grains, Cream of Tartar half a ſcruple, make a powder.

Take roots of Polypody of the Oak, sharp-pointed Docks prepared, an. one ounce, leaves of Senna ten drams, Turbith, Agarick, Epithymum, an. one ounce, Carthamus-seeds half an ounce, Citrine Sanders two drams, Annise, Carue seeds, of each two drams, being sliced, bruised, &c. digest them warm in four pound of White wine twenty four hours, pour it clear off without straining: the Dose six ounces by it self, or with a spoonful of syrup of Epithymum.

Apozems. *Or take the foresaid Ingredients and boyl them in six pound of Spring-water to half, then adde one pound of White-wine, and presently strain it for an Apozeme to be taken as the former.*

Medicated Ale. *Take roots of Polypody of the Oak, sharp-pointed Docks an. three ounces, Senna four ounces, Epithymum, Turbith, Mechoacan, of each two ounces, of yellow Sanders one ounce, Coriander-seeds six drams, prepare them according to art, make a bag for four gallons of Ale; draw it after five or six dayes, take twelve ounces more or less every morning, for eight or ten dayes.*

For ordinary Drink let a little four-gallon Vessel be filled with small Ale, wherein may be put the following Bag.

Take the tops of Tamaris, dryed Fumitory an. four handfuls, roots of sharp-pointed Docks dryed six ounces, the rinde of woody Night-shade two ounces, slice and bruise them and mingle them. Or let them take a Bochet of the Decoction of Sarsaperilla, Saunders, with shavings of Ivory, Harts-horn, and Liquorish.

Altering Remedies. II. As to what belongs to altering Remedies, beside the Physick-Ale for ordinary Drink, there seems not need of many others, but only, that a due government of Diet be observed, by declining Salt and spiced Food, Shell-fish, and others seasoned with pickle; also abstinence from Wine, Strong-waters, stronger Ale, and from all Liquors apt too much to stir and ferment the blood. In a contumacious Psora, and seizing upon a Cachectick body, it will be expedient to administer the following Electuary with a distilled water twice a day.

Electuary. *Take of Conserve of Fumitory, roots of sharp-pointed Docks, of each three ounces, Troches of Rhubarb, Species of Diatrion Santalon, of each one dram and a half, Salt of Wormwood one dram, Vitriolum Martis four scruples, with a sufficient quantity of syrup of Cichory with Rhubarb, make an Electuary, the dose from one dram to two, twice in a day, drinking upon it three ounces of the following water.*

A distilled water. *Take of the tops of Fir-tree, six handfuls, of leaves of Fumitory, Agrimony, Fluellin, Liverwort, Brooklime, of each four handfuls, roots of sharp-pointed Docks two pound, Bark of Elder two handfuls, the outward Rinds of six Oranges, cut them and bruise them, and then pour upon them eight pints of Posset-drink turn'd with middle beer, distill them in a Rose-Still; let the whole Liquor be mingled together.*

Oyntments whereof the Basis is chiefly Sulphur. III. Oyntments for to anoynt the Skin, are wont commonly and efficaciously to be prescribed for the curing of the Scab; notwithstanding those which are administred to many other Tumours or Ulcers, do not help here at all; but Brimstone and Preparations thereof seem to have a specific vertue in this Disease, so that for the most part they are put into all Liniments for the Itch, and are the basis of the whole Composition. The Receipt chiefly used by the Vulgar is this.

Forms of them. *Take Powder or flower of Brimstone half an ounce, unsalted Butter four ounces, powder of Ginger half a dram, make an Oyntment.*

A little more neat, though not much more efficacious is prescribed thus.

Take Oyntment of Roses four ounces, powder of Quick Brimstone half an ounce, Oyl of Tartar per deliquium *what suffices, make an Oyntment: for scent sake adde one scruple of Oyl of Rhodium.*

Other stronger Medicines. When the force of the Brimstone is to be drawn forth or strengthened by other things added,

Take Oyntment of Enula-campane without Mercury four ounces, powder of Sulphur half an ounce, Oyl of Tartar per deliquium *what suffices. For the same purpose the Oyntment*

ment of the roots of ſharp pointed Docks boyled in Butter, or Oyl, with White-wine, to the conſumption of the Wine, and made up with Sulphur and Oyl of Tartar. Alſo thoſe Oyntments are uſed with ſucceſs by themſelves, the more curious abhorring the ſmell of Sulphur.

3. The third kind of Liniment againſt the Itch, is made of Mercury, wanting no guards of Sulphur, or any other Vegetables. But of it ſelf it is too powerfull to be applyed all over the body, but only to the Joynts of the Arms and Thighs, or worn about the Loyns, made up in a Girdle, for ſo it ſeldom fails in curing the Itch. Notwithſtanding there is danger leſt this practice (as it often happens) produce evil and pernicious ſymptomes; for from the Mercurial Oyntment, frequently a ſalivation, alſo ſometimes dimneſs of the eyes, or drowſie or convulſive Affections do proceed: Alſo ſometimes the Poyſon of the medicine within the Præcordia or Bowels produces the dreadful Affections of ſhort breathing, Swouning, or bloody Fluxes.

The moſt powerfull made of Mercury.

But dangerous.

The vulgar form of a Mercurial Oyntment, and chiefly in uſe for the Itch, is this.

The Form of it.

Take of Quick-ſilver reduced into ſmall particles with an acid, or (as they ſay) kill'd, an ounce and a half, freſh Hogs Lard ſix ounces, incorporate them well, ſtirring them long in a Stone or Glaſs-mortar.

Neither only under the form of an Oyntment, but alſo after many other wayes the aforeſaid Medicines are wont to be often uſed. For the fume of Cinabar (which is prepared of Mercury with Sulphur) caſt upon Coals and taken in at the mouth, or ſtriking the ſuperficies of the Body, cures the Pſora. The Mercurial Coſmetick before deſcribed, being weaker by two degrees, if it be applyed upon the Skin, chiefly on the ulcerated places, it kills the Scab. Notwithſtanding the uſe of theſe is not always ſo ſecure as to be adminiſtred every where to all perſons.

A Mercurial Water for the Itch.

Baths are prepared of Sulphur and Vegetables, either apart or together, being boyled in water, which heal this Diſeaſe not as a common Bath, by only waſhing off the filthineſs of the Skin, but alſo by deſtroying the ferment thereof. Moreover, beſide theſe there is another more eaſie and neater manner of healing the Itch, *viz.* Let a Shirt boyled with Powder of Brimſtone in Spring-water, and dryed by the Sun or Fire, be worn next the body for four or five dayes; for ſo that diſeaſe is wont to be cured without bathing, or naſtineſs of anoynting, or evil ſmell.

Baths.

A Sulphurous Shirt.

If the Ætiologie of theſe be enquired into, and firſt why Brimſtone is ſuch a ſpecifick Antidote againſt the Itch, that poor and ordinary men (who have not wherewithall to uſe any other Medicine) do take againſt this Diſtemper inwardly only powder of Brimſtone with Milk, and adminiſter it outwardly with Butter, I have already in part given an account, where we have unfolded the balſamick vertue of Brimſtone towards the Lungs. Namely, it is a good expedient in either caſe, inaſmuch as it deſtroyes the acidities of the Blood and Humours, and all the exotick and corrupting roughneſſes, and reſtores a benign diſpoſition to every Juice, *viz.* a mild and an unctuous: and ſo the Particles of Brimſtone any way outwardly applyed, do eaſily enter into the pores of the skin, and being admitted inward, do forthwith work upon the ulcerous Ichor there abounding, kill the Salts there predominating, and procure a balſamick nature to the cutaneous Juice, that it may aftewards agree with the Blood and Serum continually flowing to it.

Why Sulphur is the Antidote of the Pſora.

The Reaſon of it.

As to Mercury, it is no wonder if Medicines prepared hereof do throughly heal the places of the skin affected with the Pſora wherever applyed, for by the application hereof, wheals and puſhes, and all malignant ulcers, *viz.* Venereal and Scorbutick, are wont to be tamed. Neither is it a thing to be admired, that theſe Remedies adminiſtred in any private places, as long as they provoke ſalivation, are a Cure of an Univerſal Itch; but really that without ſpitting they can produce ſuch an effect, as that a Girdle wherein Quick-ſilver is ſowed and worn about the Loyns, ſhould aboliſh the Scab of the whole body, and that ſometimes without any ſenſible evacuation or harm cauſed thereby, I ſay the reaſon hereof is not ſo eaſily apparent.

How Mercury cures this Diſeaſe.

Yet for the ſolution hereof, we muſt ſay that the Particles of Mercury being able to extinguiſh the ſcabbineſs of every Itchy ferment, when they are applyed to any private part, do preſently take away the Scab of that place; and beſides being caught by the venous blood, and diffuſed through the whole maſſe thereof, and a little after they are not only carryed back by the arterious blood to the ſame

The reaſon of its vertue.

place where taken in, but being brought outward every where, they are depoſited in the skin of the whole body, and in the ſame place deſtroy every Miaſma of the Scab: If it then ſhall happen that theſe Mercurial particles, after they have finiſhed the Cure, ſhould be all evaporated again out of the skin, no ſalivation afterwards, or other prejudice will follow.

SECT. III. CHAP. VII.

Of the Impetigo *or* Lepra *of the* Greeks.

Several names of the Impetigo.

AFter the Scab with the Itch, it follows that we treat of another Diſtemper, a little a-kin to this by reaſon of the breakings out of little puſtules, which is commonly call'd *Impetigo*, by ſome a Tetter and Morphew, and by others the Leproſie of the *Greeks*. And as it gains ſeveral names, ſo they are variouſly applyed by Authors, and by theſe they deſign one kind of Diſeaſe, and by thoſe another kind. Wherefore, as the names of this Diſtemper are variouſly confounded, and perhaps that as to its nature and formal appearance it has been various in divers Regions, neither may it be altogether the ſame in our generation as in former times, for this cauſe my buſineſs here ſhall not be to deſcribe this diſeaſe according to Books, but from the proper obſervation of the Patients themſelves.

It is deſcribed according to its appearances.

The Impetigo is wont to ariſe and affect after this manner; to wit, little wheals or red puſtules, ſometimes ſingle, and ſometimes many together, are raiſed in divers parts of the body, but chiefly in the Arms or Thighs; to each of which, new ones every where are adjoyned, (the Diſeaſe augmenting) and in a ſhort ſpace of time there become many heaps of riſings of that kind, like cluſters. For the little pimples breaking out daily near to their ſtemme, and ſpreading ſtill larger, diffuſe themſelves into a Circle, and ſo cauſe every heap of Eruptions to be enlarged. The rough ſuperficies of each appears ſomething white and ſcaly, ſo that upon ſcratching the ſcales fall off, and often a thin Ichor ſweats out, which being preſently dryed up again, hardens into a ſhelly ſcale.

Theſe Cluſters of little Pimples being firſt ſmall and fewer, appear perhaps three or four in the Arm or Thigh, or other particular member, about the bigneſs of a Penny or half a dram: but afterwards, if the diſeaſe be ſuffered to augment, they break out every where more frequent, which being leiſurely encreaſed in their ground, afterwards appear to equal or exceed the bigneſs of a Silver Crown, but not always round or of a regular Figure, but diverſly formed. Moreover there is no ſtop in this condition, but the diſtemper, unleſs it be reſtrained with Medicine, breaking out ſtill in more places, and creeping on every where in broadneſs, at length not only covers over the whole member but alſo the whole body with a leprous dry ſcurf; and this kind of Impetigo the Ancients call'd by reaſon of its outrage Ἄγριαν, and for the moſt part accounted it incurable.

The differences of this diſeaſe.

From hence the chief differences of this diſeaſe are made known; and in the firſt place as it is leſs or more malignant according to the faſhion thereof, it is diſtinguſhed, as it comes nearer the nature of the Scab, or Leproſie, or as it is in a middle condition between both. We are alſo to note, this diſtemper ſometimes infeſts ſome particular members, as the Arms or Thighs, the reſt of the body being untoucht; but ſometimes it begins together in all parts, and every where excites ſcatteringly little Pimples or Cluſters thereof. Alſo eruptions of this kind are in ſome for a ſeaſon, or periodical, and for the moſt part infeſt theſe perſons during Winter only, vaniſhing away about Summer; likewiſe on the contrary, in others they abhorre Winter, and are wont to obſerve the ſeaſon of the Swallow going and coming: but in moſt others the Diſeaſe being continual grants no truce, yea it hath neither remiſſion nor mediocrity.

How it differs from the Pſora and Leproſie.

Moreover, we muſt diſtinguiſh an Impetigo from other Diſeaſes a-kin to it, and firſt from the Scab, and the Leproſie. It differs from the former as to the form of the Puſtules; for every where in the Pſora they are ſingle and remote from one another, although by ſmall ſpaces; here moſt of them break out in Cluſters, concurrently,

currently, and as it were disjoyned by branches with great interſpaces. But between theſe diſtempers a notable difference yet ariſes, in that the Scab is wont eaſily or ſcarce otherwiſe to be propagated or ariſe, but by Contagion; but the infection of an Impetigo is ſo ſeldom or never, that the Miaſma from the Husband doth not paſs to the wife, or from her to him, though they lye together.

Alſo this Diſeaſe differs from the Leproſie, as well in reſpect of the form of its eruption, as of its contagion, which is likewiſe active in this, as in the Pſora; and the breaking out is much larger and more horrid, *viz.* it is every where ſhelly and ſcaly, without intermiſſion, and diffuſed through the whole body.

The material cauſe not a humour of the skin.

From hence it is manifeſt, that the material cauſe of an Impetigo, is not merely a cutaneous humour, by reaſon of effluvia's or a taint received from without, or depraved by reaſon of other accidents, and degenerated from its temperament; becauſe it is not eaſily communicated to others by Contagion, as in the Pſora, neither is it immediately diſperſed throughout the whole body. But indeed little Puſtules breaking out firſt about the initiations of the Diſeaſe ſeem therefore to proceed, for that certain acid ſalt Concretions happen to be in the maſs of Blood (like Tartar in Wine) which when they can neither be concocted or again diſſolved, are here thruſt out into the skin, as there into the ſides of the Veſſel. As long as theſe Concretions are ſmall and few, they are conveyed into the skin in this or that member, and by one or two branches of an Artery; then as Nature is wont to continue the ſame manner of excretion as it began, the matter being carryed every where by the ſame veſſels, to the ſame neſts, near the firſt wheals it cauſes heaps of others round about them; but afterwards when the dyſcraſie of the blood is daily augmented, and that Tartarous matter is generated more plentifully in the maſs thereof, more portions are conveyed by other Arteries, and ſtill by more to the outward places: and for that cauſe alſo more pimples break out both in the ſame, and in other members, which a new matter coming continually by the ſame Arteries, and being placed cloſe to the former, enlarges them every day, and every where dilates them by the addition of other puſtules; and at length if this ſort of Tartar of the blood augment hugely, being carryed out by more or all the Arteries together, it is faſtened in the skin, and in proceſs of time covers over all the ſuperficies thereof with a ſcaly or downright leprous ſhell: And then that cutaneous humour being wholly corrupted, promotes the diſeaſe it ſelf; for it cauſes the ſtock of the morbific matter to be encreaſed, by polluting more, or rather poyſoning the blood and humours, whileſt they paſs in Circulation; moreover diſmiſſing the corruptive ſteams from it ſelf, it renders the Contagion of the ſame diſeaſe unto others.

But tartarous Concretions begot in the blood.

The next cauſe of it.

Wherefore, both the procuring and conjunct cauſes of this Diſeaſe conſiſt in this, for that without any fault of the skin, it happens that the blood is filled with ſalt Particles of a various diſpoſition and condition; (into the preceding cauſe of which diſpoſition we will anon inquire) and where thoſe fixt and acid Salts are eſpecially predominant (as the manner is) they mutually embrace one another, and ſo grow together into Tartarous Concretions; which being thruſt forth into the blood, cauſe eruptions of wheals, as it were neſts of the Diſeaſe; then they being daily and leiſurely encreaſed both in number and largeneſs, according to the ſupply of matter, they produce the beginning, augmentation, and ſtate of this diſeaſe.

The evident Cauſes.

As to what relates to the antecedent and evident cauſes, there are two chief kinds of occaſions from which this diſtemper for the moſt part derives its origine; to wit, an evil manner of Diet, or a taint of the Scurvy, or Pox, or other Diſeaſes left in the body, being ill, or not at all cured. We will weigh a little the reaſons of each of theſe.

Irregularities in Diet.

As to the former, beſides the common irregularities in Diet, wherein ſome being too much addicted to eating of fleſh ſalted and afterwards dryed in the Sun or Smoak, and the drinking of acid Wines, do eaſily contract this malady; Alſo it is a vulgar obſervation, that very many are diſpoſed thereunto by the too frequent or daily feeding on Pork, and Fiſh, and eſpecially Shell-fiſh. There is a notable inſtance of the former, which is, that that food was chiefly forbidden the *Jews* for prevention of this diſeaſe. Alſo there is an example of the other, that in time paſt the Inhabitants of *Cornwal* for the moſt part dwelling on the Sea-coaſt, inaſmuch as the poorer ſort were fed with Fiſh, became very obnoxious to Leprous Diſtempers; inſomuch that for their relief many Hoſpitals were erected in that Countrey. That I may hint in a few words the reaſon hereof, I am apt to think whether that food is rancid,

The daily eating of Pork or Fiſh.

The reaſon thereof inquired into.

or

or otherwiſe improportionate, that it conveys particles not rightly mixed, nor eaſily to be ſubdued to our blood, which being ſo heterogeneous and largely heapt up by a long uſe of ſuch Diet, the ſaline particles of which kinde do eaſily aſſociate themſelves, and ſo do conſtitute Tartarous Coagulations to be exterminated in the skin, and the ſeeds of the Leproſie or of the Impetiginous Evil.

It often follows the Pox and Scurvy.

But yet a plentiful Crop is begot from the taint of the Scurvy and Pox left in the body, and afterwards by the combination of Salts and Sulphur exalted to extremity. We have elſewhere diſcovered the reaſons of the former diſeaſe, and eſpecially of the foreſaid ſymptome coming after it, which being accommodated to our preſent Hypotheſis do make it more clear. And it ſo often happens, that puſtulous eruptions of this ſort do follow an inveterate Pox, although it ſeem to be cured, that none diſtempered almoſt with theſe, wants the ſuſpicion of that ſhamefull Diſeaſe; ſo that the firſt Queſtion of a Phyſician in ſuch a caſe being conſulted, is, Whether the Patient have not at ſome time formerly contracted that Diſtemper? For ſurely the Corruptions of the blood, after they are by a long ſtay become altogether heterogeneous and indomitable, at length acquire to themſelves ſalt Particles, wherewith growing into ſuch like Tartarous Concretes, and being thruſt forth into the skin, produce thoſe Impetiginous Puſtules.

Its Prognoſticks.

As to the Prognoſtick part of this Diſeaſe, although it ſeldom threatens death or imminent danger, yet after it hath taken deep root, the Cure is very difficult, if at all: The Impetigo firſt beginning, and exciting a few Puſtules, and knots of them, perhaps in one or two members, ſometimes admits of Cure, but hardly without a moſt efficacious remedy. But if the Diſeaſe proceed ſo far, that the frequent and broad cluſters of wheals appear diſpers'd throughout the body, then ſmall remedies effect nothing, and the great ones howſoever diligently obſerved, will not eaſily perform a Cure. But if the Diſeaſe, maugre all remedies advance daily, and encreaſe at length into a Leproſie, *Celſus* judges it impoſſible to be cured, and therefore we muſt wholly abſtain from it.

The Cure.

There are two chief Indications concerning the Cure of an Impetigo, *viz.* Preſervatory, which reſpects the cauſe of the Diſeaſe, and the Curatory, which relates to the ſymptomes, *viz.* the puſtulous Eruptions. The vital Indication hath ſeldom place here, unleſs in a deſperate condition, where ſleep and ſtrength fail. The Method of Curing ought to begin with the Preſervatory Indication, which takes away the Cauſes of the Diſeaſe by inward remedies, for otherwiſe external (as in the Pſora) are never adminiſtred with ſucceſs; but the roots of the diſeaſe in the blood being cut off, the cutaneous ſproutings quickly conſume away: for the taking them away, we muſt proceed in one manner when the Impetigo begins by it ſelf, and in ſomewhat a different manner when it follows an inveterate Scurvy or Pox, being ill or not at all cured. We will conſider each caſe throughly by it ſelf, and diſtinctly.

Two chief Indications.

How to be cured, the Diſeaſe beginning of it ſelf.

Therefore whenſoever this Diſeaſe is ſimple, and primarie, and being yet New, let the evident and extern Cauſes be removed; let the manner of Diet, and unwholſomneſs of Air be corrected; therefore thoſe that have been lately too much accuſtomed to ſalt Diet, and the fleſh of Pork and Fiſh, let them change to Diet of good Juice and eaſie of digeſtion. They that inhabit the Sea-coaſt, or Fenny places, let them remove to a dry and clear Air; in the mean while let no leſs care be had to their Drink, by declining thick and foggy Ale, and ſmall and acid Wines too much abounding with Tartar: at length let care be taken leſt their Drink or Food be dreſſed with any mineral waters that are apt to petrifie.

The evident cauſes to be firſt removed.

The conjunct Cauſes how taken away.

Secondly, In reſpect of the conjunct and procuring Cauſe, there are two chief Intentions of Cure, *viz.* that the impurities of the bowels and humours be quickly purged out; alſo that the acid ſaline diſtemperatures of the blood and nervous Juice be altered (whereby the Tartarous matter may be the leſs engendred in them;) for theſe purpoſes Medicines both evacuating and altering are preſcribed of ſeveral kinds. Notwithſtanding, becauſe not all, but the greateſt remedies are here convenient, thoſe which are moſt chiefly of uſe and available, are Catharticks, Phlebotomy, Whey, Chalybeate Waters, Juicy expreſſions of Herbs, Decoctions of Woods, ſteel'd Medicines and Salivation. Some certain Models of each of theſe, and the manner of uſing them, we will annex.

The chief Remedies made known.

1. *A Purge.*

Wherefore in the firſt place, univerſal purging and bleeding being celebrated (as in the Cure of the Pſora) we appoint the following Tincture or purging Infuſion, whoſe doſe is from ſix to eight ounces, to be repeated in ſix or ſeven days.

Take

Take of the roots of sharp-pointed Docks dryed, Polypodie of the Oak, of each half an ounce, Senna ten drams, Epithymum six drams, Rhubarb, Mechoacan of each half an ounce, yellow Sanders two drams, Celtick Nard half a dram, Salt of Tartar one dram and a half, put them in a glass with three pints of White-wine, water of Elder-flowers one pound, let them stand stopt in a cold place three dayes, pour off daily as much of the clear liquor as is sufficient. *A purging Infusion.*

Secondly, For sweetning of the Blood, and washing of the Salts thereof, let simple Whey, two or three pints, or with the infusion of Fumitory, Chicory, and sharp-pointed Docks, be drunk every morning, for twenty or thirty dayes, if the Stomach will bear it, and likewise evening and early in the morning, let a dose of the ensuing Electuary be swallowed. 2. *Whey.*

Take Conserve of the roots of sharp-pointed Docks six ounces, Crabs-eyes, Coral prepared, of each two drams, Ivory one dram, Powder of Lignum Aloes, yellow Sanders, of each a dram and a half, Sal Prunella two drams, Vitriol of Mars a dram and a half, Syrup of juice of Wood-sorrel what suffices to make an Electuary, the dose two drams. *An Electuary.*

Thirdly, For the same reason that Whey, your Iron Mineral waters are prescribed for this Disease, and do oft notably help: for when all the other remedies have been in vain, I have with those alone cured a painfull and almost leprous Impetigo. Moreover, for more efficacy sake, let the use of Sal Prunella or Vitriol of *Mars*, or of the Electuary but now mentioned, be dexterously adjoyned. 3. *Steel'd Waters.*

Fourthly, In some endued with too much Serum, and a watery Constitution, where the drinking Whey or Mineral waters are less requisite, it is sometimes expedient that a Decoction of the Woods be assumed at physical hours, and also constantly instead of ordinary drink. 4. *Decoctions of Woods.*

Take the Shavings of Willow half a pound, of Sarsaperilla eight ounces, white Sanders, Lignum Lentiscinum, of each two ounces, Shavings of Ivory and Harts-horn, of each six drams, Filings of Tin, crude Antimony, of each four ounces tyed in a rag, of Liquorish one ounce, infuse them in sixteen pound of Spring-water, and boyl them to half, keep it strained for use.

Fifthly, Medicines of *Steel*, in that they are every where accounted among the more excellent Remedies, are wont seldom to be omitted in this Disease, although not frequently given with success: for most Preparations of Steel, wherein the Sulphureous Particles predominate, inasmuch as they ferment the blood, and irritate it into Critical Effervescences, do cause these impetiginous eruptions to augment rather than diminish; notwithstanding the Salt, Syrup, Tinctures, and infusions of Vitriol, inasmuch as they fix the Blood, and something restrain the raging of the Salts, do fitly enough agree with the intention of Cure now proposed; but being weak in efficacy, they do not prevail against so Herculean a Disease. 5. *Medicines of Steel.*

Wherefore Sixthly, these and many other Remedies nothing availing, many commend *Salivation*, as the stoutest Wrestler and only match for such an Enemy. Yet the event doth not always answer this great expectation; for I have experimented this remedy without success in four Patients labouring under a painful Impetigo, which had resisted other Medicines. Some of these were provok'd to abundant Spitting by Unction with Quick-silver, others by doses of Solar Precipitate; which they have endured for the space of twenty dayes; which time being elapsed, all the scaly eruptions and clusters of wheals have vanished; notwithstanding, to confirm the Cure, a Diet-drink of the Decoction of Sarsa was appointed, and frequent sweating under a Cradle, and due purgation between, was continued for a month: Notwithstanding, this Course being finished, when no footsteps of the distemper seemed to be left, within another month a new stock of the same Disease beginning to break out, it encreased quickly to its usual maturity. Moreover, when one of them would repeat this course, and another after two relapses would experiment it the third time, both of them at length after great sufferings of Pain despaired of Cure: Whence it is manifest that the Venereal Distemper, although highly malignant, and raising most filthy Ulcers consuming the flesh and bones, is more easily and certainly cured than the Impetigo. 6. *Salivation.*

Salivation does not always cure this Disease.

The

Why the Impetigo is more difficult of Cure than the Pox.

The reaſon whereof if we enquire, may plainly be conceived, for that the cauſe of the latter Diſeaſe conſiſts in a malignant and altogether heterogeneous pollution, infecting and poyſoning the blood and nervous Liquor for a certain time, but not altogether overthrowing, or for evet depraving its temperament; wherefore the Cure is performed by Salivation, or a ſudorifick Diet, eradicating all that venom, and then the natural diſpoſition of the blood and humours remains entire: But in a more difficult Impetigo, the Elemental particles and firſt Conſtitutives of the blood are corrupted, inſomuch that unleſs the natural diſpoſition and conſtitution of theſe are reſtored, all Evacuations and Expurgations of any venemous, malignant and heterogeneous matter, however plentiful and eradicative, do little or nothing prevail. Wherefore, many famous Phyſicians not undeſervedly judg'd this Diſeaſe being confirmed and raiſed to the borders of a Leproſie, to be hardly or never cured.

Impetigo ſucceeding a Scurvy, how to be cured.

Secondly, No better event attends this malady enſuing upon an inveterate Scurvy; perhaps hence the intentions of healing are a little more certain when this Diſtemper is placed as the Baſis or root of that; to wit, that the chief curing Indication being taken from thence, we muſt chiefly inſiſt upon Antiſcorbutical remedies; but the more ſharp and hot of this kind, as the Garden Scurvy-graſs, Water-creſſes, the Horſe-rhadiſh, Pepperwort, and others too much irritating the blood, inaſmuch as they diſſolve the temperament thereof more, and drive out more plentifully the Tartarous Coagulum to the skin, are always diſcovered to be more prejudicial than advantagious; and for this reaſon the uſe of Baths, or bathing in hot waters, which namely evacuate the humours of the whole body by an abundant Evaporation, and cleanſe the pores of the skin, and ſeem very available in this malady, often-times are ſo far from helping, that thoſe Eruptions are wont to be exaſperated from thence and very much encreaſed: for I have known many not extreamly Impetiginous, to have gone to our Baths, to bathe in the hot waters, that have returned altogether Leprous. Wherefore, when the Symptoms of this diſtemper ariſe from a ſcorbutick evil, all elaſtick things are to be avoided, and only the more temperate, endued with a Nitrous, Vitriolic or volatile Salt, are to be adminiſtred. We will lay down ſome Models of each ſort; As firſt Cryſtal Mineral, Juices of ſome Herbs and Decoctions, Salt and Mineral purging Waters, are moſt predominant with a Nitrous Salt.

Hot antiſcorbuticks do not agree.

Nor Baths.

But only the more temperate Remedies endued with a nitrous, vitriolick or volatile Salt.

Forms of Nitrous Medicines.

Take of Cryſtal Mineral, or Nitre purified one ounce, Flowers of Sal Armoniack one dram, bruiſe them in a glaſs Mortar, give one dram three or four times in twenty four hours.

Take of the leaves of Houſleek the greater two handfuls, bruiſe it and boyl it in two pound and a half of new Milk till it turn to Curds and Whey, ſtrain it, and take a pint of the clear liquor twice in a day.

Water of Sowthiſtles.

Take of the leaves of Dandelyon ſix handfuls, bruiſe them, and put them into a glazed earthen pot with a cover, which put in an Oven after the bread is drawn out, let it ſtand ſix or ſeven hours, then pour it through a Strainer, the doſe is four ounces to ſix of the clear liquor, thrice or oftner in a day.

Cucumbers.

Cucumbers being endowed with a Nitrous quality are advantagious by experience againſt this diſeaſe, wherefore in lieu of a Sallad let them be plentifully and often eaten; moreover three or four of them cut into ſlices, let them be infuſed, and ſtopt cloſe, in three pints of Spring-water all night; to the clear liquor poured out, adde Sal Prunella two or three drams, the doſe is half a pint thrice or oftener in a day. For the ſame purpoſe Decoctions of the leaves in running water together with the fruit do profit.

Purging Mineral waters.

1. Certain mineral purging waters, of which ſort are chiefly thoſe of *North-hall*, an Analyſis being made by Evaporation, manifeſtly ſhew a Nitrous Salt with which they are imbued, and I have ſometimes found the daily drinking about four pintes for many dayes, to help againſt a gentle Impetigo.

Vitriolick acidule waters.

2. But as I have before hinted, thoſe Mineral waters endued with a vitriolic Salt, of which kind are the *SPAW*, and *Tunbridge*, and *Aſtrope* Wells, do far excell thoſe Nitrous, and all other Remedies, and do more prevail in the Cure of an Impetigo. To thoſe Patients that have not the opportunity of uſing theſe waters, I uſed to give with good ſucceſs againſt this diſeaſe common water impregnated with our Steel, and

and so rendring most exactly the gust of those Mineral waters. By reason of the Mineral Salts, or at least the Mercurial Particles in them, Tin and Antimony are oft in use in the Cure of the Impetigo, and are usually prescribed with other remedies. Let the Filings of Tin, and Powder of crude Antimony, be infused in Ale for ordinary Drink: also Dectoctions of *Sarsa* made with the woods, are found beneficial against this Distemper.

Medicines of Tin and Antimony.

3. The use of a Viper, and the Preparations thereof, doth enough commend the wonderful vertue of volatile Salts in a grievous Impetigo, and also in curing the Leprosie it self. This Antidote of that Disease is reported to be found out first by a casual experiment, inasmuch (as *Galen* reports) that drink being pour'd out of a Bottle wherein a Viper was put to poyson one labouring with an Elephantiasis, and so given him to free him from his misery, prov'd his remedy, and what was destined for his murder, dispatched an incurable Disease. Hither relates the Analogy, taken from the nature of this Animal, whence they collect that it helps in this Disease: because the Viper yearly shakes off his scaly Coat, therefore some think its particles prevalent to throw off the leprous skin of a diseased man; but though we do not attribute much to these things, yet it is manifest by frequent observation, that remedies of a Viper do profit in the Impetigo and Leprosie; the true reason whereof ought to be ascribed much to the volatile Salt wherewith this Animal is endued. For the particles hereof destroy the fixt and acid Salts predominating in the blood of the diseased, and dissolve their combinations; notwithstanding, the Salt, Spirit, and Oyl chymically extracted out of Vipers, by reason of their elastick particles, contracting an Empyreuma from the fire, profit not in this disease; as also neither *Spirit* nor volatile Salt of *Harts-horn*, *Soot*, *Blood*, and other the like *Armoniacks*; because by violently stirring the Blood and Humours they rather dissolve their temperament, and thrust forth the Corruptions more plentifully into the skin. Wherefore the more simple Preparations of Vipers, as broths from their flesh boil'd in water, and Drinks impregnated by Infusions, and Decoctions, and powders being made of them dryed and beaten, are prescribed more successfully against this Disease. Moreover not only the boyl'd flesh of Vipers, but of any other kinde of Oviparous Snakes being taken in lieu of ordinary food do oft afford notable relief.

3. *Medicines endued with a volatile Salt.*

Chiefly prepared of Vipers.

But not chymically.

Broths and infusions of Vipers.

4. The Impetigo or scaly eruption of Pimples, and formed as it were into clusters, is so frequent and familiar a symptome of an inveterate Venereal distemper, that we first ask the Patient whether something of that malignity be not concealed of which they are conscious; and if we perceive the matter such, all Specificks against this Disease, and Antiscorbuticks being omitted, we must come to the Decoctions of Woods, and those little or nothing helping, we must descend to the use of Quick-silver. And truly by this method I have cured many that were accounted Impetiginous and Leprous, (who have been handled long in vain, and wretchedly vexed with other Remedies appropriate to these diseases:) But we referre this sort of Impetigo to the Pathology of the Venereal distemper, whereto it is an Appendix.

4. *How the Impetigo following the Pox is to be cured.*

II. The second Indication curatory relating to the Disease it self, and the primary symptom, to wit, the scaly eruptions and clusters of Pustules, prescribes Topical Remedies to be applyed to the outer skin for the removing these effects; for which purpose in the first place Baths and Liniments are convenient: which yet rarely or never help of themselves, unless the procuring cause, that is, the Tartarous disposition of Blood be first purged out.

The second Indication Curatory.

There is a vast medley of Topicks of this sort vulgarly vented, as well by Physicians as by Empiricks and Quacks; among all which notwithstanding, Baths or Liniments compounded of Tarre do far excell all other Remedies of either kind, insomuch that we should only use these but for their ill savour; wherefore we will annex some models of Compositions both with and without Tarre.

Topicks of Tarre are the best.

Wherefore, for Baths it is common to take water out of Tubs wherein Tarre hath long stood, and impregnated with the infusion thereof: Or,

Take of Tarre two pound, and with white Ashes sifted incorporate it into a gross mass, which boyl in a sufficient quantity of Spring-water, adding leaves of Ground-Ivy, Fumitory, white Horehound, the roots of sharp-pointed Dock, Enula-campane, of each four handfuls, make a Bath to be used with government; Or let such a Decoction be prepared without Tarre for Patients abhorring the smell.

Baths. *Sulphureous Baths* as well Natural as Artificial are found by experience leſs appropriate, yea for the moſt part the former do prejudice; Moreover, every bathing ought cautiouſly to be adminiſtred: for becauſe this adminiſtration exagitates the blood, and puts it into an Effervеſence, its Temperament is endangered (as has been ſaid) rather to be diſſolved, and the corruption to be ſpread more plentifully over the skin.

Liniments. 2. *Liniments* whoſe uſe is more ſafe, and convenient, are of a Triple kind or degree, *viz.* Gentle, Indifferent, and moſt Strong; of each of theſe we will propound one or two patterns.

1. Mild Liniments. 1. Firſt therefore in a ſlighter Impetigo, when the Eruptions and Cluſters are ſmall, Faſting Spittle is commended; likewiſe the weeping of green Wood in the Fire, alſo mere rubbing them with roots of ſharp-pointed Docks bruiſed and macerated in Vinegar: Or,

Take Oyl of Tartar per deliquium, *Oyl of Nuts or Almonds by expreſſion of each equal parts, make a Liniment to be uſed to the parts affected twice in a day.*

2. Stronger, of Tarre. 2. Liniments of the Second kinde have Tarre for an Ingredient, which is eſteemed above all.

Take of Oyntment of Roſes ſix ounces, of Tarre two ounces, melt them together: Or,
Take a fat piece of Weather-mutton, which ſtick with the roots of ſharp-pointed Docks, ſpit it and roaſt it, and in the mean while baſte it with Tarre dropt leiſurely upon it; the Dripping being received in a Veſſel under it, keep it for an Oyntment moſt excellent for an Impetigo.

3. The ſtrongeſt of Mercury. 3. The moſt prevalent Liniments are Mercurial, *viz.* thoſe made with Quick-ſilver or Præcipitate. Let the model of the former be that preſcribed already againſt the Scab; for the other,

Take of white Præcipitate three drams, Oyntment of Roſes three ounces, mix them, for to anoynt the parts chiefly affected.

The uſe of theſe ought chiefly to be ſuſpected in this Malady; for if ſpitting be raiſed, that great glutt of matter impacted in the pores of the skin will be moved, which if the whole together ruſhing too much towards the *Ductus Salivales*, gather about the parts of the Throat, will endanger ſuffocation.

A notable Relation. Some years ſince a Virgin of a Noble Family, being of a hot Temperament, and endowed naturally with a ſharp and ſalt blood, after being a long time obnoxious to an Impetigo, almoſt from her Cradle, about her riper years began to be afflicted more grievouſly; for the cluſters of ſcaly Puſtules covered not only her Arms and Thighs every where, and the other covered parts of her body, but alſo her Hands and Face were ſo defiled, that ſhe was aſhamed to appear abroad or converſe with others of her rank. Leſſer remedies almoſt innumerable were exhibited without ſucceſs; by uſing Baths ſhe at firſt appeared relieved, but at length grew worſe thereby. *Aſtrope* Wells which have cured ſome, afforded her little or no relief. Wherefore, when all ordinary means would not effect any thing, I propounded Salivation, as a remedy more prevalent than all the reſt and (as it is accounted) the laſt. When the Parents and Patient readily conſented to this advice, preparing her body duely by Purgation and Phlebotomy, I gave her (after our manner) Pills of Solar Præcipitate two dayes, and after the interval of one day, the remedy being repeated the next, an abundant and laudable ſpitting began, and continued for a month without any ill ſymptome; to keep which in its due tenour, I applyed a Mercurial Oyntment to the bending of the Joynts and the places moſt affected one while to one, another while to another. Before the finiſhing of this courſe, all the Eruptions vaniſhed; notwithſtanding to confirm the Cure, as alſo for the extirpation of the Mercury, ſhe remained another month in Purging, Sweating, and Diet of the Decoction of *Sarſa*, *China*, &c. in which time ſeeming perfectly cured, ſhe ſo remained for about forty dayes. But afterwards though ſhe obſerved an exact courſe of Diet, the ſame diſeaſe began to bud forth again, and leiſurely encreaſing, at length it advanced into its former ſtate. I being confounded with this event, perſwaded her to hope an alteration for the better after her Menſtrual Flux, which was ſuddenly expected. Not-

Salivation cures for a time the Impetigo, but with a relapſe.

withſtanding,

withſtanding, after long delay that Criſis at length happening, and managing her ſelf regularly after it, brought no Cure or eaſe of that Diſeaſe, but rather a freſh aſſault. Whereupon recourſe was had again to Phyſick, and divers Remedies aſſay'd, all which when they became fruſtrate, her friends importuned that ſhe might ſalivate again, to wit, allured by this hope, that that method which cured her for a ſhort ſpace, being adminiſter'd again, would cure her either for a longer ſpace or altogether. Wherefore according to their wiſhes, the ſame courſe of ſpitting and ſweating repeated for two months ſpace, and thereupon the Puſtules every where going off, the Noble Virgin ſeem'd again wholly to recover her health. But within a fortnight after the courſe finiſhed, the Puſtules and their Cluſters again appeared, and leiſurely encreaſing daily in number and bulk at length grew fouler than before, inſomuch that like an *Hydra*, after the loſs of one head this diſeaſe received ſevenfold.

That remedy repeated, did not thoroughly cure the Diſeaſe.

I knew another ſtrong man endowed with a luſty habit of Body, who after he had laboured with an Impetigo many years, the malady ſtill encreaſing, and being advanc'd to the higheſt, he was covered all over with a white Scurf, as it were leprous, that every night the Scales fell off like Bran in great plenty in his bed, and might be gathered up in heaps. This man for Cures ſake firſt tryed the ordinary Remedies of every kinde, notwithſtanding without ſucceſs; and afterwards trying a lighter Salivation, found himſelf nothing better: but afterwards the ſame method being repeated, by a long and painful Spitting, he ſeemed to be reſtored to health; but within three months the ſame diſeaſe budding out, in a ſhort ſpace arrived to its former outragiouſneſs; Moreover, when he had undergone the third time that moſt painful Remedy, that affect, which ſeemed expulſed for a certain time, returned again; and afterwards maugre this and all methods, it exercis'd its Tyranny during the Patients life. It will not be requiſite here to diſcourſe any thing of the *Lepra*, which being only a more intenſe degree of the former Malady, for the moſt part admits of no Cure. As to what relates to other Tumours, and their manifold kinds, and the Ætiologies or Reaſons of each, I confeſs I am ſcarce able to contain my ſelf, but that I ſhould enter upon that pleaſant Field of Speculation. But this ſeems as irrational and unuſual, as for one wearyed with a long Courſe, and breathleſs at the end, running beyond his Poſt, preſently to begin a new Race.

FINIS.

A TRACT OF THE SCURVY.

CHAP. I.

The Contents.

A Description of the Scurvy. The Internal and neareſt Cauſe of it is chiefly in the Blood, and alſo in ſome part radicated in the nervous Liquor.

THere is ſo rare Mention, and ſo ſlender Deſcription in the ancient Medicine of this Diſeaſe, which we call the Scurvy, that ſome have doubted, whether there were in the times of old any ſuch Sickneſs, though now epidemical in many places, and almoſt every where ordinary, and with which every one is trouble, or at leaſt thinks himſelf troubled with it; and which like the Pox and the Rickets, is derived a great way down to the Children: but certainly it is plain by the teſtimonies of *Hippocrates*, *Areteus*, *Pliny*, and others, that this Affection though known by other Names, was taken notice of by the Ancients, and that its cure hath been treated of though after a ſlender manner.

Being not very ſolicitous concerning the appellations of this Diſeaſe, we will preſently proceed to the knowledge and application of its Nature: which as it is ſo diffuſe and extends its ſelf into ſo various and manifold Symptoms, that it can neither be comprehended by one definition, or ſcarce by a ſingular deſcription, it will ſeem beſt firſt of all to recite all the *Phænomena* of this Diſeaſe, or to relate the Hiſtory of the more notable accidents of it, and thence to accommodate a certain *Hypotheſis* for the right ſolving its appearances.

A recital of the chief ſymptoms of the Scurvy.

As to the firſt, there are reckoned up a great company of Symptoms in the Scurvy, and manifold Affections and of diverſe kinds; and which ſometimes are of an oppoſite or contrary nature to it: yea if any unuſual accident, never before heard of in an humane Body happen, when it cannot be referred to any other kind of Diſeaſe certainly, we preſently without doubting pronounce it the Scurvy: ſo that this Diſeaſe, like one condemned, and of an evil Name, ſuffers for others faults: In the mean time it is wont to excite ſymptoms very many from its own power, which appear almoſt in every part of the Body, a recital of which will be beſt performed by a diſtribution of the parts of the Body. Therefore that we may thorowly handle the marks of the Scurvy, from the beginning to the end,

In the Head.

we will begin firſt from the fountain of it in the Head: and to this belong great and habitual Headaches, and thoſe either by certain fits, or at certain times, ſometimes a numneſs or ſtupidneſs of Spirits, ſometimes pertinacious Wakings, frequent Giddineſſes, and Swimmings in the head, Convulſions, Palſies, plentiful Spittings, Ulcers in the Gums, a looſneſs of Teeth, a ſtinking in the Mouth. Secondly, ſometimes in the region of the Breaſt, pains in divers parts of its membranes,

In the Breaſt.

and chiefly about the *Sternum*, which being often ſharp and piercing, do miſerably torment thoſe labouring with this Diſeaſe night and day, a frequent *Aſthma*, difficult and unequal breathing, a ſtraitneſs of the Breaſt, a ſtriving with an empty Cough and inordinate Pulſe, a trembling of the Heart, frequent Swoonings, and often faintneſs of Spirits, or a fear of it almoſt continual. Thirdly, this Diſeaſe,

In the lower Belly.

as it were fixing its chief ſeat in the lower belly, produces an Iliad of Diſeaſes: for often they have Nauſeouſneſs, Vomitings, Belchings, gnawing at the Heart, Inflammations, and grumbling of the *Hypochondria*, often Colicks, and troubleſome Griefs running up and down here and there, almoſt a continual *Diarrhœa* or Looſneſs, ſometimes a Dyſentery or Flux, or a deſire of going to ſtool, a waſting away of the Fleſh, and ſometimes an *Aſcitis*.

The Urine, for the moſt part red and lixivial, with a cruſtineſs ſwimming in it, or elſe ſticking to the urinal: ſometimes alſo by fits it is pale and wateriſh and

In the outward Parts.

in abundance. Fourthly, beſides theſe Affects of the Belly, there are wandring pains and thoſe not ſeldome highly painful, and troubling chiefly at night in the external Members, yea thorow the whole habit of the Body they feel a heavineſs and ſpontaneous wearineſs, a waſting of the Fleſh, an ach about the Loyns, and a debility and enervation of other Members; in the Skin ſpots of ſeveral colours, Tumours, Pimples. and often venomous Ulcers ſhew themſelves about the Muſcles: a Numneſs, Stifneſs and pricking, and as it were the aſcenſion of a cold air, Alſo Contractions, and leapings of the Tendons: Beſides, to ſcorbutical Perſons happen inordinations of the Blood, uncertain Effervеſcencies, wandring Intemperaments, erratick Fevers and great Hæmorrhagies. Beſides theſe more common and accuſtomed ſymptoms of the Scurvy, of which ſome have more ſome leſs, and which infeſt them now after one manner, and now after another manner, and in another kind, oftentimes there happen other unaccuſtomed and prodigious accidents to this Diſeaſe.

The evident cauſes of the Scurvy.

For the more full knowledge of this Diſeaſe, it ſeems good that we here obſerve as it were lightly, what concerns the original, beginning or firſt invaſion of it. For we are to inform you, that the Scurvy may be produced by reaſon of ſeveral Cauſes and occaſions: for although an ill courſe of Diet, a ſedentary life, the inordination of the Spleen, and the Crudities heaped up in the firſt paſſages are very much accuſed; yet there is wont to be a further cauſe, as the unwholſomneſs of the Air, and the evil *Craſis* of the Blood, vitiated by former Diſeaſes: wherefore the Scurvy or Scorbute is often venacular or peculiar to mariſh places, and to the Sea Coaſts: and frequently falls on thoſe who much uſe the Sea, and feed much upon ſalt and ſmoak-dry'd Meats, and who are forced to drink putrefied Water: and often ſucceeds to continual Fevers, and to other chronical Diſeaſes ill cured; alſo to great Hæmorrhagies and other evacuations; and to uſual excretions, as the Piles and monthly courſes being ſuppreſſed: Moreover this Diſeaſe, without any great forerunning cauſe, is excited not ſeldome by contagion, and ſometimes is alſo hereditary.

The cauſe of the Diſeaſe diffuſed thorow the body ſticks either.

It manifeſtly appears, from what we have obſerved concerning this ſcorbutick Affection, that the material cauſe of this Diſeaſe is not contained in any private place or ſingular mine, but is diffuſed thorow the whole body and every part of it, both within and without: from whence we gather that the ſcorbutick Miaſm or

Contagion

Contagion, is poured forth, either in the Blood or in the Nervous Juice or in both: And indeed, the eruptions of Spots, and little whelks, the redneſs, and as it were lixivate urine, or like lie, plainly teſtifie the Contagion to be placed in the effervency and inordinatneſs of the Blood; to which another like prognoſtick may be added, the divers production of this diſeaſe, which for the moſt part ſucceeds the depravation of the maſs of Blood: no leſs do the troubleſome dolors, both within in the Membranes, and without in the Muſcles, the debility of the Members or reſolutious, the *Vertigo*, Cramps, and frequent faintings of the Spirits declare the fault or vice to be in the nervous Juice. Therefore, when both the general Humours are in fault, we will ſee which is firſt and chiefly vitiated, and from whence it draws its Contagion, and by what means it communicates its harm to another humour, and to any other parts, that are wont to be affected.

To the Blood or to the nervous Juice or to both

As to the Blood (in whoſe maſs the Scurvy ſeems moſt of all to be rooted) we have elſwhere ſhown, that its diſpoſition is even almoſt of the ſame temper, and of ſuch like particles compoſed, as Wine: for that we have hinted, the Blood, even as Wine, to be ſick, chiefly from two cauſes, to wit, either, becauſe that there is ſomething extraneous, and not to be truely mingled with it, poured into one or the other, or elſe becauſe the diſpoſition of the Liquor, or its temperament is perverted, that is, for as much as ſome things that are to be in Subjection, either to one Element or to another, and which ought to be ſubjugated, are exalted.

The Dyſcraſie of Blood and Wine Compared.

As to the firſt we have obſerv'd of ſome, that when the *fæces*, are firſt ſecreted, and thruſt up from the bottom, they are by being moved, lifted up; or if any exotick thing be caſt into the Pipe, as Sewet or Sulphur, preſently a notable perturbation is ſtird up; by which, unleſs it be ſoon quieted, the whole *Craſis* of the Wine will be in danger to be ſubverted. In like manner there are many things not miſcible, which diſturb the Motion and Circulation of the Blood, by being poured into it, and hinder it, that it cannot perform its due œconomy, the nutritious Juice being full of the feculences, does inordinatly ferment the Blood, and as we have formerly ſhown, that Liquor becoming degenerate, ſtirs up the paroxyſms of intermitting fevours; the vaporous Recrements of the Blood, the ſerous, bilous, and melancholy being retained in the boſom of it, bring forth Catarrhs, Dropſies, Jaundice, Melancholy, and many other Diſeaſes: but if that extraneous thing be removed in time, it ſoon, even as Wine freed from its extraneous mixture, recovers its priſtine Condition. But either Liquor, being for a long time infected with thoſe heterogeneous contents, ſo that the due *Craſis* is at length degenerate, it is not then eaſily to be reſtored.

As to things not miſcible poured into either.

2. Beſides, both Wine, and Blood, by reaſon of many other cauſes, depart from their right Temperament. As to Wine there are many ways and reaſons whereby its Liquor is perverted from its legitimate diſpoſition: which may alſo be parallel'd, by as many, if not more, in the dyſcraſie of the Blood. (For this is often wont to be ſuddenly empoyſon'd and broken, which does not eaſily happen to Wine) 1. Therefore, we may obſerve of Wines, that they do not ſometimes attain to maturity, but for want of Spirit they remain crude, for as much as the Spirits, and the other active principles of Sulphur and Salt being overwhelmed with more thick and groſs parts, cannot extricate themſelves; wherefore they become without Spirit, but having a thick conſiſtence, and ungrateful taſte, degenerate into a taſtleſs Wine: and almoſt after the ſame way it is, when the Blood, the Spirit, and Sulphur depreſſed, becomes crude and watry, and without Vigor, and unable to be inkindled afreſh in the Heart. And this kind of diſpoſition of the Blood *Horſtius* affirms to be the cauſe of the ſcorbutick affection; but this ſame diſpoſition, ſeems rather to infer the *Pica*, or ſtrange longings of women with child, as alſo the Dropſical diſpoſition, than the Scurvy, as we ſhall ſhew more at large anon. 2. The ſulphureous parts of Wine being exalted above the reſt, cauſe an immoderate effervеſcency or ebullition in the Liquor, and is called in our idiom or proper Speech, *Fretting of Wine*: In like manner, the ſulphureous parts of the Blood being too much provoked or carried forth, cauſes a feveriſh intemperance, and is apt to be inflamed in the Heart, and indeed is the cauſe of very many fevers together. 3. Not ſeldom the Spirit in Wines growing weak

As to the temper of either variouſly altered.

and the Sulphur being bound up, the ſaline part being carried into a flux overcomes the reſt; wherefore the Liquor becomes ſour. The famous *Sennertus* thinks the Blood in the Scurvy to be altered as Wine degenerated into Vinegar, which we ſhall ſhew by and by, to be otherways. And we have formerly ſhewed, the dyſcraſie of the Blood, being grown ſour, cauſes Melancholy. 4. There yet remains another ill diſpoſition of Wines, to which we may very aptly compare the ſcorbutick Diſpoſition of the Blood, to wit, when the Spirit being depreſſed, the ſulphureous and the ſaline Particles being combined together, are exalted, and as this comes to paſs in Wines, after a two fold manner, ſo alſo by the like affection of the Blood we may deduce from thence a two fold Kind of Scurvy, as we ſhall ſhew more clearly anon. It is then a common obſervation in Wines, that beſides their degenerating into a taſtleſs Liquor, and into ſour Vineger, they do ſometimes, the Spirit being depreſſed, and the Sulphur and Salt being together exalted, become rancid, or ropy, or mucilaginous; in proper terms, *Wines that are fretted, or ropy.* In either mutation, the Spirit being ſubjugated, the ſulphureous and the ſaline Particles being aſſociated together, exceed the reſt of the Elements, and cauſe the diſpoſition of the Liquor, to become of their Nature. But yet the buſineſs is not performed, altogether after the ſame manner, in both: for that in the former dyſcraſie of the Wine the Sulphur is ſomething more potent, than the Salt, but in the latter the Salt exceeds the Sulphur: ſo that either of them being the ſtronger, their Lord, the Spirit, being caſt off; they agree one with the other, and ſurmount the due tenour. The reaſon of either, may ſeem to be unfolded after this manner.

The Scorbutick Dyscraſie of the Blood like Wines when they become.

Fretted or Ropy

When generous Wines have grown hot for a long while, the particles being much agitated and ſtriking one againſt another, the Spirit partly evaporates, and partly overwhelmed in the more thick Elements, is ſuppreſſed: In the mean time, the Sulphur (of which there is the greater plenty) being more carried forth by the agitation, and ſo caſting off the yoak of the Spirit, adheres to the Salt, and lifting that up, alters the mixture of the Liquor, which by reaſon of the riſing up of the Sulphur combined with the Salt, becomes rancid, or fretted: In like manner, when thin Wines have been kept long, the Salt is carried forth, and diſpreſſes the Spirit, overcome by its *fluor*, and ſo ſubjected by its watriſhneſs, the Liquor becomes ſour, or ſharp; after that the Salt growing eminent, the Sulphur (of which there is a leſs quantity) cleaving to it, and intimately uniting, converts the Conſiſtency of the Liquor from thin to thick, and as it were of an oily ſubſtance; and from an acid, ſour taſt to a very ingratefull, and as it were muſty.

It is probable that after the ſame manner the Blood is altered in the affection of the Scurvy, as Wines, as often as they become too hot, degenerate into fretted and ropy; for it is an argument, that this diſeaſe does not depend ſo much on the feculencies mixed with the Blood (though ſuch ſhould be there, they might be at laſt driven forth, and their ſupplies cut off) but on the habitual dyſcraſie of the Blood; becauſe the Scurvy being radicated, is ſo difficult and ſometimes not at all, to be cured. Moreover we may affirm, the dyſcraſie of the Blood which cauſes the Scurvy, to be two fold, as of the Wine, to wit, a ſulphureous-ſaline and a ſaline-ſulphureous diſpoſition. For as there are very great variety of affections, which are ſtirred up by the Scurvy; yet all of them may be aptly enough reduced to two principal Heads, or as it were two Fountains of evill, to wit firſt, that the blood being touched with the ſcorbutick Miaſm or Contagion, becomes either very fervid or hot, in which the Sulphur having dominion, aſſociates it ſelf powerfully with the Salt: wherefore it being made more rancid or fretting, grows inordinately hot in the veſſels, and perpetually ſends forth from it ſelf aduſt recrements, to wit, concretions of Sulphur and Salt, and diſperſes them here and there, which ſpreading outwardly, produce ſpots, pimples, whelks, or ulcers: but being inwardly layd up, bring forth a diſpoſition to Vomit, pains about the heart, Looſneſs, Fluxes and grievous pains. In this kind of Scorbutick rancidity or frettedneſs of the Blood, temperate Remedies only are convenient, and often Blood-letting, Scurvigraſs, Horſe-radiſh, or other things endued with a ſharpneſs and incitation: even by the like means as fretted Wines are cur'd, by diſcharging them from their *faeces*, and by pouring into them, Milk, Flower, or Starch, Glew, or other Demulſions or Sweetnings this is helped. Or in the ſecond place, in blood

nouriſhing

nouriſhing the Scurvy, Salt has the chief dominion, and aſſociates Sulphur to it ſelf: wherefore it is not ſo fervid, but like ropy Wine becomes thick and mucilaginous, and is ſlowly circulated in the Veſſels, and is apt to ſtuff the *Viſcera* in its paſſage, and to affix there its feculencies as it were mud. Thoſe affected after this manner, for the moſt part without any puſtulaes or eruptions of the skin, become ſluggiſh, breathleſs and feeble. and labour with ſpontaneous weakneſs and ſtraitneſs of the Breaſt; and are found to be obnoxious to the paſſions of the Heart, the *Vertigo*, and Convulſions: In the ſcorbutick diſpoſition of this kind, more hot Remedies, and ſuch as are indued with a volatile Salt; yea Chalybeates or ſteel Medicines, which may fuſe and agitate thorowly the Blood, are wont to be moſt uſed, and are to be handled even after the ſame way, as ropy Wines, to wit, to be ſoundly ſhaken and agitated; and alſo to them are put Lime, burnt Allum, *Gypſum* or Plaſtering, Sea ſalt calcined, and the like indued with an high acritude or ſharpneſs. So much for the beginnings of the Scurvy radicated in the Maſs of Blood: There yet remains to be unfolded, for what cauſes the Blood degenerating from its proper nature, conceives this or that morbifick diſpoſition, bringing forth the Scurvy. But it firſt behoves us to ſhew by what means the ſeeds of this Diſeaſe lye hid in the nervous juice, the other general humour.

By what means the ſcorbutick Contagion is impreſſed on the nervous Juice.

We have elſewhere declared that from the Blood driven to the confines of the Brain, there doth diſtil a ſubtle Liquor, both for the matter and for the vehicle of the animal Spirits, and that it doth diſperſe it ſelf every where thorow the *Encephalon* and the nervous Stock: This *Latex*, ſo long as it is right and good, conſiſts chiefly of Spirit and Salt combined or volatiliſed in it, and with theſe and the *modicum* of Water, wherewith they are waſhed, there ſeems to be little need of Sulphur and Earth: but yet this concretion of Spirit and volatile Salt doth indeed conſtitute the moſt precious humour which penetrates, paſſes thorow, actuates, and irradiates all things, concerning which the Chymiſts have dreamt of their *Alchaeſt*. At the beginning of the Scurvy, whilſt the *Craſis* of the Blood and the tone of the Brain are not thorowly vitiated, this watring liquor of the Brain and Nerves, being as yet ſpirituous, ſweet, and not very unfit, performs performs all the functions to which it is deſtinated: but afterwards out of the bloody Maſs made poor and very much weakned, a much thinner *Latex* and inclining towards Vinegar drops forth: and further, from the fœculented Blood and as it were rancid or fretted or ropy heterogeneous Particles and very much infeſted are carried to the animal Regiment, and that being made weak within the brain, they are admitted without repulſe, and thence poured forth with the moiſtning Juice on its *Appendix*, both medullar and nervous: and from hence in ſeveral Regions of the flowing animal Spirits, ſometimes faintings and wanting of ſtrength, ſometimes painful and ſpaſmodick, or cramplike diſtractions, and exploſions do follow. Wherefore a *Paralyſis* or Palſy, Convulſions, *Vertigo* or turning round or giddineſs in the head, , tremblings, and other preternatural Affections of the Brain and nervous Stock, are wont to fall on thoſe who have the Scurvy deeply rooted: concerning which we will hereafter ſpeak more particularly. In the mean time we will take notice in general, that the ſcorbutick Contagion affixed in the nervous Juice, conſiſts in one of theſe three or in all of them together, *viz.* that the moiſtning of the Brain and Nerves becomes much thinner or poorer; or that it degenerates from its ſaline diſpoſition into ſourneſs; or that it is ſtuft with heterogeneous Particles.

Hitherto we have ſhown after what manner the firſt ſeeds as it were of the ſcorbutick Affection are ſown in the Blood, and from thence in the nervous Juice. Before we will conſider of the fruits or ſymptoms of the Diſeaſe, excited by reaſon of the evil diſpoſition of either of the humours and the reaſons of them, and their manner of becoming ſo; we muſt inquire into the more remote cauſes and differences of the Diſeaſe it ſelf: to wit, that it may appear from what cauſes or occaſions, and by what proviſion the ſcorbutick diſpoſition is impreſſed on the aforeſaid humours.

CHAP. I.

Chap. II.

Of the more Remote Cauſes of the Scurvy, by which its Contagion is affixed on the Maſs of blood, and conſequently on the nervous Juice.

HAving ſhown in the former Chapter, what is the conjunct and neareſt cauſe of the Scurvy, *viz.* the evil diſpoſition impreſſed on the Blood and nervous Juice, it now remains, that we inquire into the more remote Cauſes, by which the Contagion of either humour, and chiefly of that which is chiefly and firſt in fault, is carried into the Blood: for the depravation of this being detected, it will eaſily appear, how the morbifick Miaſm or Contagion is derived to the other Juice. Therefore as we have determined, that the ſcorbutick Affection is chiefly founded in the vitiated Blood, and that the evil of it conſiſts, whilſt the Spirit is depreſſed, in that the Salt and Sulphur, as in Wines becoming fretting and ropy, is unduly exalted; we will ſeriouſly conſider, how this or that diſpoſition is impreſſed in the maſs of Blood.

The opinions of others concerning the original of the Scurvy recited.

But we ought not to paſs over what other Authors, diligently ſearching after the nature of the Scurvy, have determined concerning its Cauſes and Subject. As there are many opinions of this thing, almoſt all agree in this reſpect, that the fountain and origine of this Diſeaſe is derived from the fault of the *Viſcera*, and the ſeat of its product is placed in the bloody Maſs, to wit, that this being almoſt only infected with their vitiouſneſs, contracts the ſcorbutick Contagion. The more Ancient did impute the chief cauſe of this Diſeaſe to the Spleen, not rightly performing its office: but as the office of the Spleen was conceived this thing by ſome, another thing by others, and a different thing by theſe; they ſhewed the production of this Diſeaſe after a ſeveral manner. *Wierius*, *Echtius*, *Albertus*, *Ronſſeus*, *Eugalenus* with many others, ſuppoſing that the Spleen was the receptacle of the excrementitious melancholick Juice ſeparated from the Blood, have determined the internal and next cauſe of the Scurvy, to be a plenty of lutulent or muddy humour, and of melancholy only, or alſo of that mixed with others, framing a peculiar form of corruption, which abounds about the Spleen and Liver, and in the Veins themſelves, This opinion might deſervedly challenge our aſſent, if it had pronounced the ſecretion of the melancholick Juice from the Spleen being neglected or hindred, to be ſometimes and in part the cauſe of the Scurvy; but that this Diſeaſe is held to ariſe always and altogether from the default of the *Viſcera*, is very highly improbable; as will hereafter be made plain, when we ſhall declare the far more potent cauſes of the Scurvy. Other Authors attributing the office of ſanguification to the Spleen, ſay that the Scurvy is produced, for that the Spleen does not turn that part of the Chyle deſtinated to its ſelf, into laudable Blood. But again others as *Reuſnerus*, *&c.* have thought the more humid and watry parts of the Chyle to be prepared in the Spleen, and to be converted into Blood. Therefore they judged the next and internal cauſe of the Scurvy to be the watry and ſerous humours, which not being received by the Spleen, were poured on the Blood, and ſo produced the original of the Scurvy. In the mean time others, as *Platerus*, *Bauhinus*, *&c.* ſayd that the thicker part of the Chyle being drawn by the Spleen, was the cauſe of ſanguification, and by it to be prepared for it ſelf, and other parts convenient Blood. From this ſuppoſition *Gregory Horſtius* ſaid the cauſe of the Scurvy to be the crude and ichorous Blood in the whole Body, but yet chiefly in the *Hypochondria*, offending not only in quantity but with a kind of ſpecifick corruption, proceeding from the imbecillity of the Spleen, *viz.* becauſe thorow the preternatural Affection of the Spleen, the more crude parts of the Chyle, are not averted from the ſanguification of the Liver, from whence the blood in the veins of the Liver and Spleen is firſt depra-

ved,

depraved, and then by the Commixtion of ſtrange matter the Sanguification of the Liver is hindred, by reaſon of the object not righly diſpoſed, for as much as the chyle, by reaſon of the hurt of the Spleen, was not depurated in its juſt meaſure. *Horſ. appen. ad. lib. 2 part. 2 Sect. 1 de Scorbuto.* This opinion eaſily falls to the Ground, becauſe he aſſerts, contrary to the Laws of Sanguification, the Spleen to ſanguifie and to draw the more crude parts of the chyle to it ſelf; when tis well known, there is no paſſage for the Chyle to the Spleen. Alſo this miſtake is refelled by the opinion of *Reuſnerus* and others, which affirm the next and internal cauſe of the Scurvy to be the ſerous and watry humours which the Spleen ought to draw, and by its peculiar office of Sanguification, to convert into Blood.

The moſt learned *Sennertus*, although with the former he artributes alſo the office of Sanguification to the Spleen, *Inſtitut lib. 1. cap. 9* yet he derives the cauſe of the Scurvy otherways than from the fault of this *Viſcus*. For he affirms, that by reaſon of the evil Concoction of the Chyle in the firſt paſſages, and being deſtitute of Spirit, ſalt and tartareous Feculencies to be heaped up, about the Meſentery and Cawl, and theſe being continually augmented by the approach of new matter, and moiſtened by the *Serum*, to be at laſt transferred into the Spleen and Liver, and from thence into the Stock of the veins, and ſo in them to infect the whole bloody Maſs, and to render it crude and ſalt. He calls this firſt Mine of the Scurvy, gathered together in the firſt paſſages, a melancholy Humour; which beſides he ſays to be ſerous, ſtopped up with pituitous humours, and by reaſon of its ſtay in thoſe parts, corrupted afrer a peculiar manner: Then he adds, that this humour is generated by the fixion of the Spirit and volatile Salt, after the ſame manner, when as Wine changes into Vinegar.

The Scurvy does not always ariſe by the fault of the Spleen or the firſt paſſages.

Several Reaſons of no ſmall moment do convince me, that I cannot in all things aſſent to this opinion; however probable it ſeems. For beſides that this Doctrine does not exactly quadrate with the Circulation of the Blood, ſince by its Law the humours in the meſaraic veſſels are ſcarcely gathered together apart from the other kind of Veſſels, at leaſt there is not any paſſage for them from thence into the Spleen, moreover it is not rightly determined, that the Scurvy begins only in the firſt paſſages; for ſometimes it is contracted by mere Contagion. Neither alſo do we think that this Diſeaſe proceeds from the fixedneſs of the Salt, or from the Crudity of the Blood and humours: for oftentimes it ſucceeds to long continued Fevers, and that rather ſeems to proceed from aduſtion and too great deflagration of the Blood, than from any advention of the Chyle and other humours in the firſt paſſages: moreover ſometimes a Sea and mariſh air induces this Diſeaſe, though no Crudities are begotten about the *Viſcera*: and the ſick do not complain from the beginning, of their Appetite and Digeſtion. Indeed wee grant, as to what belongs to the Crudity and the fixity of the Salt, in the Chyme (or ſecond digeſtion) or the Blood, and defect of Spirit, that from theſe cauſes a ſickly Diſpoſition is oftentimes produced, but not therefore preſently the Scurvy, but rather the *Malacia* of longing women, *Pica* of Virgins, the phlegmatick Dropſie, or ſome other dropſical diſpoſition ſucceed. Therefore ſince the Scorbutick Ætiology hath been deliverd by Authors, to whom the Circulation of the Blood was not known, and agrees leſs with the Truth, we will open the whole matter will that Key, and to the beſt of our Skill more accurately unfold the cauſes, both procatartick and evident, of this Diſeaſe, according to the Law of Sanguification.

We have already hinted that there are many occaſions and procatartick means from which the Scurvy ſeems to deduce its original. 1. In ſome places it becomes national or peculiar, ſo that the morbifick Contagion is drawn in together with the vital Spirit, by reaſon of the evil Influence of the Air, and of the vapours, wherewith it is ſtuffed 2. Very often this Diſeaſe follows upon long continued fevers, and other Chronical Diſeaſes and is very deſervedly accounted the affects or products of them 3. Sometimes it is hereditary, and is propagated by traduction from Scorbutick Parents 4. Sometimes again it is taken by mere Contagion 5. An evil manner of living, inordinations as to the things non-natural, an innate or acquired Dyſcraſie of the *Viſcera* ſometimes induce a Scorbutick affection, more often contribute to its birth, or nouriſh the inkindling. We will conſider the reaſons of every one of theſe effects.

1. There

By what means unhealthfull Air breeds the Scurvy.

1. There is none of the ordinary ſort of People, but confeſſes that the Scurvy is very often contracted by the fault of the Air, aud it is almoſt in every bodies mouth, that places neer the ſea ſide, mariſh lakes, and moiſt places, render the dwellers obnoxious to intermitting Fevers, or the Scurvy: wherefore the ſickly, or ſuch who have any regard to their health, do chooſe their habitations far from ſuch kind of places. Indeed ſuch an humid Air, continually diffuſing filthy exhalations and infection, becomes unwholſome in a double reſpect, and often brings forth the Scurvy, *viz.* by reaſon of Tranſpiration being hindred: and becauſe of the ſuſception of an incongruous Ferment. For in the firſt place, people dwelling in a thick and not purified Air have the paſſages and Pores of their skin much cloſer, or ſhut up: wherefore when the *Effluvia* of the Blood are not duly exhaled, but the ſame retained within, ferments the reſt of the bloody Maſs, and diſpoſes its active particles to various inordinations. Then in the ſecond place, for as much as at the ſame time filthy vapours, ſtinking, incongruous Salt and Sulphurs are ſucked in, by reaſon that the Spirits of the Blood are greatly depreſſed, and in the mean time its ſulphurous and ſaline particles are carried forth to the extremity, and from thence the *Craſis* of the ſanguineous Maſs being by degrees changed, it degenerates into an evil diſpoſition. And indeed, the ſulphureous part of which being exalted by it ſelf induces a notable rancour to the Blood; and there is wont to be excited, ſometimes continual, but often intermitting fevers ſo familiar, by the unwholſome air, for the reaſons elſewhere ſhewed. If from ſuch an occaſion (as it very often happens) the ſaline principle is carried forth together with the Sulphur, ſuch a ſcorbutick diſpoſition as we have above deſcribed, like to fretted or ropy Wine is impreſſed on the Blood. Not only a great tract of humid and vapourous Air, is unwholſome after this manner, but alſo to dwell in houſes ſcituate neer any mariſh, or encompaſſed abont with a pond or moat, or in houſes new plaſtered with lime, renders perſons obnoxious to this Diſeaſe.

2. Why it follows upon long fevers.

2. A Fever of long continuance, very often induces the Scurvy: the reaſon of which manifeſtly appears from our *hypotheſis*; for from the often, and too much deflagration, of the Blood the Spirits are very much waſted, and like liquor that becomes poor and liveleſs; by its burning, a great plenty of the more pure Sulphur evaporates, and in the mean time what is left of it, aſſociating to it ſelf the Salt, carrying it up, is wont to cauſe the *Craſis* of the Blood to become planely morbid and ſcorbutick. It is to be obſerved, after a long Fever, by reaſon of the Spirit and Sulphurs to much exhaling and very much of the Salt being for a long time concocted with the remaining Sulphurs, that the Blood becomes very ſalt, and as it were lixivial, ſo indeed that from thence, it is ſcarcely enough inkindled in the heart to perform the circulation: ſuch a diſpoſition of the Blood is not to be reſtored, but by a long time, and is very difficultly hindred from running into the Scurvy. Not only after fevers, but alſo after other chronical diſeaſes, evilly cured, the Scurvy is induced, and that for a double reaſon or means of affecting, to wit, either becauſe the Blood is changed by the preſent diſeaſe towards a ſcorbutick diſpoſition, or becauſe the diſeaſe hinders the ſick for a great while, from any exerciſe, or motion, and from thence they are inclined, by a long Idleneſs and ſitting ſtill, to the Scurvy. The firſt is diſcerned in Melancholy, when by the depreſſion of the Spirit, and the Salt being carried out into a *fluor*, the Blood turns to a Sourneſs. This kind of *Craſis*, the Sulphur afterwards aſſociating with the Salt, and both of them being carried forth, eaſily paſſes into the Scurvy. The Hypochondriack Affection is ſo much of kin to the Scurvy, that it very often takes it for a Companion: for the melancholy feculencies, which only after the nature of that affect pollutes the Blood, afterwards perverts its *Craſis*, and renders it ſcorbutick: in like manner the Jaundice and Dropſie which at firſt only infects the Blood by an impure and incongruous Mixture, after a long ſtay, quite changes its Temperament. 2. Many other Diſeaſes accidentally induce the Scurvy for as much as the ſick are hindred from any kind of Labour or Exerciſe; ſo that their blood is very little eventilated, but retained, like Wine a long time upon its lees, looſes its *Craſis* or Temperament, and is liable to the inordinations of the Salt, and Sulphur. After this manner the Palſie, *Lumbago*, or feebleneſs of the Loins, the fracture of Bones, Ulcers, Wounds long time in curing, render Men obnoxious to the Scurvy. 3. The

3. The Scurvy is ſometimes contracted by ſucceſſion, ſo as the contagion of the Diſeaſe being derived to Children from their Parents, without any other external or internal cauſes, produces infected fruits exactly like the nature of the ſcorbutick Affection: So have I known Children ſprung from ſickly Parents, to have been affected with wandring pains in their Limbs, an eruption of Spots, an eroſion and rotteneſs of the Gums and Teeth. Beſides it is obſerved, the Children of Parents touched with the venereal Diſeaſe, to be obnoxious to moſt grievous ſymptoms, like to the ſcorbutick Affection. The reaſon of theſe ſorts of affections ſeems to conſiſt in this, for that the filthy taint being impreſſed on the genital humour, becomes like empoyſoned ferment, which although it for a long time lies hid, being involved with other Particles, at laſt exerts its power and raiſes up the ſymbolick Elements of Sulphur and Salt in the Blood or nervous Juice, and by carrying them above the reſt of the Particles, inclines to the ſcorbutick taint. *3. How it is contracted by Succeſſion.*

4. By the ſame reaſon and means of affecting, the Scurvy is propagated by contagion, *viz.* the Effluvia's proceeding from an infected Body, and entring into the Pores of one that is near or inſpired by the Breath, ferment either the Blood or the nervous Juice, or both of them together: and ſo by carrying up the ſpirituous-ſaline, and ſulphureous Particles, pervert the Temperament or *Craſis* of the Liquor, according to their nature. *How by Contagion.*

5. The cauſes of the Scurvy hitherto cited, reſpect more immediately the bloody Maſs, and ſhew the diſeaſe to begin from its *latex*, without any great fault in the firſt paſſages. But leſt we ſhould think this Region, to which ſome attribute all the fault; to be wholly free; it ſeems to be determined according to the judgment of others, that the rudiments of the Scurvy is alſo ſometimes conceived within the *Viſcera* of Concoction, and from thence traduced into the Blood: For when it happens from the Chyle, being for a long time vitiated, that the nutricious Juice becomes incongruous, and is ſtuffed with Particles of enormous Salts and Sulphurs, which it carries to the bloody Maſs; there is a neceſſity that its *Craſis* will at length be changed, and perverted according to the nature of the matter, by which it is conſtantly and daily ſupplied. Wherefore it is obſerved, that thoſe who eat much of ſalt or ſmoke-dryed Meats, and drink much Wine and ſtrong Waters, by which means Salt and ſulphureous Particles are violently carried into the Blood, are found to be very much obnoxious to the Scurvy: Beſides thoſe who feed much on Swines fleſh or Fiſh, although freſh, but eſpecially on Shell-fiſh, for that theſe Aliments have in them plenty of rank Sulphur and Salt (as may be gathered by the extreme ſtink of their putrefaction) are very apt to fall into the Scurvy, and which is more, ſometimes into the Leproſie. On the contrary, they are not ſo incident to this Diſeaſe, who eat milk meats, raw and unripe fruits, freſh Cheeſe and other abſurd things, which heap up in the Ventricle a great quantity of Phlegm; neither is the Juice nouriſhing the Scurvy, produced from depraved or ill digeſted meats; but ſometimes Aliments fit or convenient enough turn into a morbifick matter by the fault of the *Viſcera*; which indeed happens not always by the fault of the Liver or Spleen, as ſome have thought, for theſe have no buſineſs with the Chyle, but the Stomach it ſelf being endued with an extraneous ferment, perverts every thing that is put into it, and changes it ſometimes into a ſour, ſometimes into a Salt or vitriolick pulp, and it is very likely alſo that the incongruous Juice from the Pancrace, or the cholidical paſſage, may be mixed with the Chyle, and imbue it with an heterogeneous tincture. We do not deny but that the Spleen and the Liver do not ſeldom contribute to the production of the Scurvy, but yet not the Chyle but more immediately the Blood ſuffers for their faults when the Liver is obſtructed; ſo that the aduſt recrements of the Blood are but little or ſmally ſeparated, by reaſon that its Maſs being more feculent, becomes too luxuriant with the particles of Salt and Sulphur concocted together. As to what relates to the Spleen, it is not altogether undeſervedly, that ſo many complaints are exhibited againſt it, as to the production of the Scurvy: For as the office of this Bowel (as we have before ſhewn) conſiſts in this, that it doth receive and ſeparate both the atrabilary or melancholy feculencies of the Blood, which conſiſt in a fixed Salt and Earth, and alſo that it digeſts the ſame by a further concoction into a ferment, to be mingled again with the Blood: If then at any time the Spleen does not rightly perform theſe its Offices, the maſs of Blood is wont to be infected in a double reſpect: to wit, either becauſe the atrabilary or melancholy fæculencies are not wholly received by the Spleen being *How the Viſcera and the firſt ways are in fault.*

obſtructed or debilitated; or becauſe being received, the ſame are perverted into an unfitting and corruptive ferment of the Blood: After this manner and ſome times after that, the ſanguinious Maſs becomes evilly diſpoſed, and not rarely by this only occaſion, or by the acceſſion of other cauſes, degenerates into a ſcorbutick diſpoſition: And indeed from ſuch a foregoing cauſe, we have formerly declared the hypocondriack affection to ariſe, to which truly the Scurvy (as even now we hinted) is ſo near a kin, that it moſt often is a companion with it, or follows hard after it. But it plainly appears by the obſervation before cited, that the Scurvy does not always and only ariſe from the fault of the Spleen: For ſome time paſt there was a noble Gentleman, who for many years had laboured under a ſcorbutick affection, accompanied with very many and grievouſly horrid Symptoms; The Phyſicians whilſt they had this Gentleman in cure, concluded his ſickneſs to be contracted by the fault of the Spleen; and all thoſe heavy evils to come upon him for the ſake of that Bowel: At laſt after being afflicted almoſt with continual pains, for the ſpace of ten years, and alſo with the *Paralyſis* and miſerable Convulſions, waſting away, he died with a Conſumption. The Corps being opened it appeared to the ſenſe, that the Spleen ſo evilly defamed was free from all fault; for this inward was very laudable in figure, magnitude, ſubſtance, and colour, and without any tumor or obſtruction: Beſides the ſanguiferous Veſſels being opened and freed from their ſtuffings, the nervous Fibres appear'd firm enough, and the Blood contained within the pores of the Spleen, free from corruption.

Wherefore ſadneſs and immoderate Studies beget the Scurvy.

Among the cauſes of the Scurvy, that are wont to be derived from the inordination of the *non*-naturals, we may here deſervedly place ſadneſs, for it is every where obſerved, that men through ſome occaſion ſtruck with ſorrow, and ſo remaining for a long time ſad, do become ſcorbutick. The reaſon of which ſeems to be this, great ſadneſs immediately affecting the inferior or bodily Soul, compells inwardly both its parts, to wit, the ſenſitive and the vital, ſtraitens their *Syſtaſes* or conſtitutions, inhibiting their wonted expanſions, and draws them into a leſſer ſpace. Hence the Animal Spirits being hindred from their due expanſion, remit their Oeconomy, wherefore the Blood repeating its Circuits in a leſſer compaſs, is apt to be heaped up about the boſom of the heart, and there to ſtagnate for this reaſon, when the Spirits of either Government, *viz.* either animal or vital are depreſſed, and the Blood and nervous Juice begin to be altered in their complections, either of them by degrees loſing their vigor, turns from a generous Liquor to one ſour and liveleſs: Beſides the *Viſcera* of Concoction being denyed the wonted influx of Spirits, perform very untowardly their Offices. Hence from the Chyle not rightly concocted, or being depraved in its coction, the nutritious Juice being ſtuffed with feculencies, becomes vitious; and is poured on the bloody Maſs, whereby it more perverts its *Craſis*, and cauſes it eaſily to paſs into a ſcorbutick diſpoſition. Moreover for this reaſon, immoderate and too ſerious ſtudies, and the continual intention of the mind, for as much as from hence the Spirits being depreſſed, and the offices of the *Viſcera* ſubverted, the chief *Craſis* of the humours altered for the worſe, they often acquire a ſcorbutick taint: To which we may add, that both ſad and ſtudious perſons, for the moſt part lead a ſolitary life; for which cauſe, both the Blood and nervous Juice, as water wanting motion contracts mud, is wont to be vitiated and ready to fall into a ſcorbutick corruption.

The ſcorbutick taint is derived from the Blood to the Brain and nervous ſtock.

Theſe are, if not all the procatartick or more remote cauſes of the Scurvy, yet at leaſt the chief of them which affix its taint on the Blood; there will not need any other Ætiology, to ſhew how it is derived from the hurtful Blood into the nervous Juice, for the Blood by its accuſtomed rite and law of circulation, diſtils a portion of its ſpirituous Liquor into the Brain: But as we have before ſhewn, from the Blood depauperated a thin *latex*, and from that a ſharp liquor and ſalt withal, is drawn off after the manner of ſalts when they are diſtilled: Alſo beſides from the feculent Blood, and as it were, muddy heterogeneous Particles, infeſting the animal Kingdom, are brought forth; which notwithſtanding are not eaſily admitted into a firm and ſound Brain. Wherefore as ſuch Particles being received within the *Encephalon*, do induce thereupon paralytick affections or Cramps; ſome cauſes precede, by which the conſtitution of the Brain is debilitated, of which ſort they uſe to be, 1. Its evil hereditary Diſpoſition. 2. Frequent Surfeits or eating too much, immoderate drinking of Wine, noon Sleeps, great Hæmorrhagies, and other occaſions, whereby either the animal Spirits are too much conſumed, or the

pores

pores and paſſages of the Brain, relaxed, and too much opened, that they admit of every thing brought from without.

CHAP. III.

Of the differences of the Scurvy, alſo of the Signs, Symptoms, and Cauſes of this Diſeaſe, and chiefly of thoſe which ariſe by reaſon of the taint being impreſſed on the Blood.

The differences of the Scurvy.

FRom the cauſes of the Scurvy hitherto deſcribed, it will be eaſie to aſſign the differences of this Diſeaſe: For in the firſt place; this affection may be diſtinguiſhed according to the twofold Region of the conjunct Cauſe, *viz.* the Blood and the nervous Liquor, for that it is either of this or that Kingdom chiefly, and is more deeply rooted now in the Blood, now in the nervous Juice. Secondly, according to the double taint of the Blood affected, to wit, as that ſhall be either ſulphureous-ſaline, or ſaline-ſulphureous, it ſhall alſo ſignifie the Scurvy by divers Names, or it ſhall be called according to the vulgar appellations, either bilous or hotter, ſhewing it ſelf in ſpots or whelks, and other more apparent ſymptoms; or Melancholy, whoſe poyſon lying hid, as it were covered with aſhes; is known rather by the intrinſick hurt of the faculties, than by outward eruptions. Thirdly, according to the Original and manner of invaſion of the Diſeaſe, to wit; for as much as it is received either by contagion, or that it ariſes through an internal *procatarxis* or remote cauſe; alſo according to its various ſtate, it is many ways diſtinguiſhed, and is either beginning, more perfect, or deſperate, and requires divers manner of Indications as to the Cure, of which we ſhall treat more largely hereafter. In the mean time, it is our buſineſs to recite the ſigns and ſymptoms of the Scurvy, and to add the cauſes of them, and after what manner they happen.

Signs and Symptoms.

The Signs by which Prognoſticks or *Indicia* of the Scurvy are taken, are either extrinſick, to wit, certain accidents and circumſtances, which till the more certain notes of the Diſeaſe appear, give a ſuſpicion of it: So we may deſervedly think, any one having a very ſickly diſpoſition, to have contracted ſome taint of the Scurvy, if he be ſprung from ſcorbutick Parents, or if he have long converſed with a Wife, or Companions affected with it; or if he live near the Sea Coaſt or marſhy or otherways unwholeſom places, or if he ſhould have had before a long Fever or other Chronical Diſeaſes, or if he ſhall be ſenſible of help by anti-ſcorbutick Remedies, and that ſuch ill diſpoſition be without a Fever, or certain ſigns of any other Diſeaſe. Or Secondly, the ſigns of this Diſeaſe are preſent affects and ſymptoms, to wit, inherent to the ſick body; which ſort as they are manifold, are wont to be variouſly diſtributed, and reduced into certain Claſſes; that is to ſay, for as much as they are proper to the Scurvy, or common to it with other diſeaſes, alſo for that they are excited, either about the beginning or in the increaſe of the Diſeaſe, or in its worſt ſtate or condition. Further, they are diſtinguiſhed according as they ſhall be excited in the various parts of the Body internal or external, alſo for as much as they may happen either in the Head, Breaſt, the *Abdomen*, or about the Members or habit of the Body: By this way we have already recounted the ſcorbutical ſymptoms. But they may be aptly enough diſtributed according as they ariſe, either by reaſon of their taint, being fixed chiefly in the Blood, or by reaſon of the faults of the nervous Juice, or by reaſon of the congreſſion, or as it were conjunct influences of either humour becoming enormous. We ſhall as much as we can, inſiſt on this method, in reciting and unfolding the ſigns and ſymptoms of the Scurvy, although in the mean time, very many affections which ſeem to proceed from the ſingular fault of this or that humour, procure ſome fault of the other humour, to be alſo a part of the cauſe: As to what relates to the præternatural affections of the

firſt paſſages, and the *Viſcera* in the Scurvy, although they ſometimes proceed from errors in living, yet moſt often the ſickneſſes of theſe parts becoming indeed permanent ariſe by reaſon of the Blood or nervous Juice, as ſhall be declared hereafter in its proper place. In the mean time, we will ſhew at once how the chief ſymptoms of the Scurvy proceed from the fault of this or that humour, or conjunctly from both.

1. What kind of Affections ariſe by reaſon of the ſcorbutick Dyſcraſie of the Blood.

1. When as the Blood is very much infected with a ſcorbutick taint, evil ſymptoms follow for three chief Reaſons, *viz.* 1. Becauſe its Liquor being depauperated, wants its wonted vigor; ſo that it can neither be inkindled in the heart freely, nor be circulated lively and equally: For which Reaſon, a dejection, and as it were a falling down of the whole Soul, Sadneſs, Anxiety, difficultnefs of Breathing, a ſtraitneſs of the Breaſt, intermitting Pulſe, frequent Swoonings, and inordinate ſuffuſions of Heat and Cold follow. 2. The Blood abounding with feculencies, pours all about its Recrements on the parts which it waſhes: Wherefore Spots outwardly, Pimples, Whelks, Puſtles, and Ulcers are excited. Hence alſo, Catarrhs, the Dropſie, a ſwelling of the Members, Ulcers of the Gums, Vomitings, Lasks, Fluxes, great Spitting, Sweats, a lixivial Urine, or filled with Contents, as alſo tumors of the *Viſcera*, or obſtructions do not ſeldom follow. 3. A poor and feculent Blood ſupplies the Brain and nervous ſtock with but a vicious Liquor; and ſo by the means of thoſe Parts it communicates its faults: Beſides, a depraved Blood does not afford preſently a *Copula* or joynting to the Spirits, every where abounding within the Fibres, convenient enough exploſive for the acts of the locomotive faculty, from whence a ſpontaneous laſſitude, or wearineſs, and impotency to the moving of the parts proceed.

2. How impreſſed on the Brain and nervous Juice by reaſon of the taint.

2. In the Scurvy, the moiſtning juice of the Brain and nervous ſtock, after it is infected with the filthy taint, offends in a treble reſpect. 1. For as much as it declines from a noble and ſpirituous, into a poor and thin Juice, from whence a languor and enervation of the whole Body, and in ſome part alſo an Atrophy proceeds. 2. For as much as this Liquor is changed from a ſpirituous-ſaline, into a ſour, acetous Juice, from whence melancholy and fear, a failing of Spirits, and a ſuppreſſion from their wonted vigor, and alſo almoſt continual griefs and irritations of the nervous parts, and a crackling of the Bones are induced. 3. For that this Liquor is ſtuffed with heterogeneous Particles, and infecting the animal Regimin, Convulſions, Spaſms, or Cramps, Palſies, Vertigo's, ſoporiferous Affections, or pertinacious Watchings, at laſt Fooliſhneſs, or Moping, or Madneſs ariſe.

3. How by reaſon of the Conjunct evils of either humour.

3. In a more heavy and inveterate Scurvy, the recrements of the Blood and nervous juice, being depoſited together in divers parts, for as much as they are endued with ſaline Particles, which are of a divers nature, they encounter one with another; and by a mutual ſtriving and effervescency, produce moſt horrible Symptoms. From hence ariſe intollerable dolors, chiefly at night, wandring pains in the Joynts, Rheumatiſms, and other affections of this kind. After this manner, from the double fountain of the ſcorbutick taint, very many Rivulets of evil affections running every where in all parts of the whole Body, create griefs.

4. That yet a more full knowledge may appear, it will not be from the matter, to recount each of the aforeſaid Symptoms, and the reaſons of every one of them, and how they come to paſs particularly to deliver.

The cauſe of the Symptoms unfolded.

1. The firſt ſign of the Scurvy, by which oftentimes a ſuſpicion of the beginning of this Diſeaſe is given, is a ſpontaneous wearineſs, to which are added impotencies as to motion, alſo a debility of the Thighs, and as it were a ſenſe of weight or heavineſs. Theſe Symptoms are wont to ariſe about the beginning of this Diſeaſe, and are derived rather from the fault of the Blood, than of the nervous Liquor, which is as yet ſcarcely infected: But this may be done in a double reſpect, *viz.* in the firſt place, for as much as the Blood being made impure, flings out ſerous feculencies in its circulation, and inſinuates them into the pores and paſſages of the Muſcles, wherewith they are ſtuffed and loaden, ſo that the Spirits being hindred and intercepted, they perform not freely enough nor lively their locomotive exploſions: Beſides, the parts being loaded as it were with a certain Burthen, they are not eaſily and readily moved as formerly. 2. From a vicious Blood, the exploſive *Copula* of the animal Spirit becomes degenerate and weak, wherefore they neither readily accompliſh, or nimbly perform the local motions: We believe in an inveterate Scurvy the impotency as to motion to ariſe alſo from depravation of the nervous juice, and from the want of Spirits.

Spontaneous wearineſs.

2. Difficult

2. Difficult breathing and a ſhortneſs of breath upon any motion, is a familiar ſymptom of the Scurvy, of which as there are wont to be two cauſes, it depends now upon one now upon the other, and ſometimes on both together. The ſcorbutick *Dyſpnœa* or ſhortneſs of breath, if it be very frequent and almoſt conſtant, comes from the very poor, and as it were, liveleſs ſtate of the Blood, whereby it is indeed apt to ſtagnate, and not to be eaſily inkindled in the Heart: wherefore from any motion, as the Muſcles urge the ſanguiferous Veſſels, by compreſſing every where their contained liquor, the Blood ruſhes ſomewhat more plentifully into the boſom of the heart, which when it is not there preſently inkindled, and carried forth of doors, it lies heavy at the heart, and threatens a decay of the vital function: Therefore the Lungs that they may bring help, are moved more ſwiftly, that the Blood may be drawn forth quickly, and ſo for this end, to wit, the circulation of the liveleſs Blood, and of it ſelf almoſt immoveable, the often and ſhort breathing is cauſed. In this caſe, with laborious breathing there is alſo a quick and ſmall Pulſe. 2. Sometimes the ſcorbutick *Diſpnœa* or ſhort breathing proceeds from the fault of the nervous ſtock, for after the morbid or filthy taint has occupied the Brain and its appendices, the heterogeneous Particles ſent from the *Encephalon*, as they are of kin to other nerves; ſo alſo to other Spirits, to wit, thoſe ſerving to the motion of the *Diaphragma* and the Muſcles of the Breaſt, come to the Brain; and ſo according as thoſe Nerves are either inhibited or perverted from performing rightly their offices, a difficult reſpiration is produced of a various kind, and is for the moſt part either Paralytick or Convulſive: For the morbifick Particles entring into the nervous ſtock, and about their foldings or extremities being more plentifully heaped up; are fixed with plenty of Spirits. Hence it ſometimes happens from ſuch a cohæſion of Particles, (if perhaps they be Narcotick) that the Spirits inhabiting thoſe Nerves, are every where bound and hindred from their deſigned actions: Whence reſpiration being hindred, other Spirits the gueſts of Nerves yet free, that they may perform the common task by their own ſtrength, are very much ſtirred up, and ſo as much as they may, they cauſe a more frequent and laborious reſpiration. But whenever the Spirits flowing within certain Nerves, for the office of reſpiration, are affected with an heterogeneous, exploſive, or ſpaſmodick *Copula* or joynting of the ends of the Muſcles, for the ſake of whoſe preſſing out, when they are excited through plenitude or for other occaſions, they run into convulſive motions: And from thence the Lungs are detained with laborious and often repeated turns, now of *Syſtoles* now of *Diaſtoles*, like to aſthmatick Paroxyſms. In theſe caſes, ſometimes the Nerves of the *Diaphragma*, ſometimes the Pneumonick, and thoſe abſolving the motion of the Breaſt, alſo ſometimes perhaps thoſe embracing the *Bronchia*, ſometimes theſe, ſometimes thoſe apart from the reſt, are ſtupefied or obnoxious to cramplike affections, and for that reaſon the various differences and ways of the anomal or unequal reſpiration occur: Some kinds and examples of which we may add hereafter. I know ſome aſcribe the cauſes of the aforeſaid Symptoms to the Vapours elevated from the Ventricle and its Neighbourhood, whoſe opinion in another place we have deſervedly rejected, with reaſons ſhewn to the contrary. *Eugalenus*, *Horſtius*, and *Sennertus*, whom others follow, deduce the cauſe of the ſcorbutick *Dyſpnœa* or purſineſs, from the *Viſcera* of the lower belly, being inflated or tumefied, and by that means preſſing the Cawl, as it uſes to come to paſs in Hydropicks, and women big with Child. But I cannot aſſent to this opinion, becauſe this ſymptom does not ſeldom happen to thoſe, whoſe Belly and *Hypocondria* are ſoft enough, and who have the ſinking below the Ribs, and the ſpace for the motion of the *Diaphragma*, free enough, as I have often found upon examination. But, that difficult reſpiration falls upon Hypochondriacks, and ſometimes alſo upon Scorbuticks, upon the perturbation of the Spleen, the reaſon is, becauſe the ſplenick Nerves communicate with the pneumonick: Therefore indeed when either of them are beſet with the morbid, *viz.* the ſpaſmodick matter, and the ſame being moved in either of them, ſtirring up Cramps; it draws the others into a conſent of affection, as I have already manifeſtly declared, diſcourſing of the hypochondriack paſſions: In all difficult reſpiration excited by reaſon of the fault of the nervous ſtock, the Pulſe though for the moſt part ſtrong enough, yet becomes quicker than it ought to be, and ſometimes intermitting.

Difficult Breathing.

A ſtraitneſs of the Breaſt heavily infeſts ſome ſcorbutick perſons, which kind of ſymptom hath joyned with it a difficult reſpiration, and commonly is aſcribed to the

A ſtraitneſs of the Breaſt.

the ſame Cauſe, to wit, from the compreſſion of the Caul by the elevated *Viſcera*: But yet though the Breaſt be ſometimes by that means ſtraitned, that thoſe purſily affected can hardly draw their breath, but that the taking in of the breath terminates in the midſt of the *Thorax*, yet ſometimes on the contrary, they draw in the Breath too deeply, ſo that they breath it out again hardly and difficultly; which certainly by no means ought to be attributed to the inequalities of the inferior *Viſcera* in the *Diaphragma*; but either to the undue accenſion of the Blood in the Heart, or rather to the preternatural affection of the Nerves, ſerving for reſpiration: By the like reaſon alſo the cauſe of more difficult inſpiration or taking in the Breath, is deduced from the ſame fountain, *viz.* in either caſe the Nerves ſerving for the drawing in and thruſting out the Breath, for that they are poſſeſſed with a morbifick matter, and that either Narcotick or Spaſmodick, they perform in the executing their proper Offices either more or leſs than they need to do. But ſometimes ſcorbutick Perſons are troubled with a ſtraitneſs of Breaſt, without the breathing much hindred; ſo that they feel the compaſs of the *Thorax* to be more ſtrictly drawn together, and to be contracted into a narrower ſpace: In the mean time, thoſe ſo affected complain rather of the anxiety of the heart, than of any hindrance of the motion of the Lungs: The cauſe of this ſeems to be, that the Membranes inveſting the *Præcordia*; for as much as being too much irrigated with a ſerous humour, together with the nervous, become more contracted like wet Leather: So that their Fibres being irritated, wrinkle themſelves too much into ſhort Convulſions or Spaſms, and from thence they force the containing parts to be ſtraitned: Beſides, this kind of ſtraitning of the *Præcordia* follows in ſome part the motion of the Heart it ſelf: For whilſt the Blood is made poorer, it does not leap forth ſtrongly enough from the boſom of the Heart, nor flames out openly into the Lungs. Wherefore theſe need the leſs to be dilated or expanded, but rather that they may anſwer to the circulation of the Blood, performed in a leſſer compaſs, and exactly quadrate to the inveſting Membranes, and to the nervous Fibres deſtinated to their motion, they are regulated according to the weak limits of expanſions: Wherefore this conſtriction of the *Præcordia*, as I have obſerved in very many, is wont to be ſuddenly remitted and intended, by reaſon of the occaſions of Joy and Sadneſs, even as the Blood leaps out more plentifully or more ſparingly from the boſom of the Heart, the greater or the leſſer ſpace is proportionated to its Circulation.

Inordinate Pulſe.

4. An unequal and an intermitting Pulſe, alſo frequent ſwoonings and fear of the ſame, very often happen in the more grievous Scurvy, the ſame reaſon of which as of unequal breathing, is aſcribed deſervedly, now to the undue accenſion of the blood in the Heart, and now to the inordination of the nervous ſtock: The Blood being made more ſaltiſh, and beſides much ſtuffed with ſcorbutick feculencies, is but unequally and brokenly inkindled, like the oyl of a Lamp imbued with Salt and muddy filths: Wherefore from hence an irregular Pulſe, with a waſting of the vital ſpirits in the Brain is ſtirred up. Moreover, when the cardiack Nerves are alſo beſet round with a morbifick matter, ſo that the influx of the animal Spirits, by which the motion of the heart is continued, is not performed in a juſt dimenſion and equal manner, by that means it happens that the motion of the heart is ſomewhat hindred, and its reciprocations variouſly diſturbed; an inequal or intermitting Pulſe, and a ſmall and weak ſeems to proceed from the dyſcraſie of the Blood, but if it be great and ſtrong enough, from the fault of the animal function.

The paſſions of the Heart.

5. The trembling palpitation and great leapings of the heart often happen to thoſe ſcorbutically affected; theſe ſort of paſſions are merely convulſive, and altogether depend on the cardiack Nerves, to wit, belonging to the heart it ſelf or *Pericardium*, beſet with a ſpaſmodick and exploſive matter: For the animal Spirits, the inmates of the Nerves themſelves and of the Fibres, and their appendices being inordinately exploſive, compel the whole joynting of the heart to be cruelly ſhaken and moved. In the mean time, whilſt the whole bulk of the heart is agitated by that means, it does often rightly perform the proper motions of *Syſtole* and *Diaſtole*, as I have obſerved in many, who with ſuch a ſhaking of the heart have had an ordinary and laudable Pulſe.

Wandring Fevers.

6. Erratick Fevers, alſo ſudden ſuffuſions of heat and cold in ſeveral parts of the Body, uſe to come upon an inveterate Scurvy: The reaſon of the former is, becauſe the extraneous matter being often carried to the Blood with the nutritious Juice, for that alſo the alible Juice it ſelf is made degenerous, becauſe it is not rightly mixed

mixed with the Blood, they ſtir up its extemporany effervescencies. In the mean time, a Fever obſerving a regular type, for that cauſe excited rarely happens to Scorbuticks, becauſe the ſalſuginous Blood, although it be taken with a feveriſh burning, does not burn long nor much, at leaſt not equally: As to the ſudden ſuffuſions of heat and cold, they indeed ſeem to be inferred ſomewhat by reaſon of the affection of the nervous ſtock; for that the Nerves and Branches and nervous ſuccours, do diverſly embrace and compaſs about the ſanguiferous Veſſels in moſt parts of the Body, perhaps for that uſe, that the courſe of the Blood might be urged and reſtrained, as it were with Goads and Bridles, according to the force of the paſſions, and other exigencies of Nature, it is very likely that when the œconomy of the animal Kingdom is perverted by the ſcorbutick taint, that moſt of the Nerves and Fibres and their Appendices, being ſtretched out here and there; do every where run into ſpaſms or convulſive motions, and alſo by reaſon of their hurt, the irregularity of the Arteries and Veins are contracted: So that the Blood is compelled into theſe parts more than it ought, and is too much eſtranged from them, from whence theſe kind of inordinations of heat and cold proceed.

Nightly Sweats.

7. Plentiful Sweats chiefly at night, are wont to be very troubleſome to ſome ſcorbuticks, the reaſon of which is, that as the nutritious Juice being daily brought into the maſs of Blood, by reaſon of the dyſcraſie or evil diſpoſition of this, and the impurity and filth of that is not aſſimulated; but being rejected of the Blood is ſent away under the form of Sweat. But that the nutritious Juice in the time of its aſſimilating, becoming degenerate; does not produce an intermitting Fever after its manner, the cauſe is the ſalſuginous intemperature of the Blood, which therefore becomes leſs able for periodick deflagrations: this ſort of immoderate ſweating happens chiefly in the Scurvy, following upon a long Fever or other Chronical Dyſcraſies, where the nutritious Liquor is perverted, rather by the default of the aſſimilating Blood, than of the concocting *Viſcera*.

Lixivial urine.

8. In a more certain Scurvy, as in other Diſeaſes, we conſult the Urinal: For if the Urine appears intenſly red, and as it were lixivial without a Fever or the Jaundiſe, we undoubtedly pronounce this a ſign of that Diſeaſe: For whilſt the ſerous *Latex* is circulated for ſome time with the ſoluted Salt and Sulphur, the ſaline and ſulphureous Particles being inconcocted in the ſame, beſtow on it a very deep and as it were lixivial tincture: Alſo that ſuch Urine abounds very much with contents, which, the ſtale being cold, precipitate to the bottom, it altogether owes it to the Particles of the degenerate nutritious Juice, ſnatched away with the *Serum*. But yet the Urines of the ſcorbutick perſons often vary, for ſometimes they appear of a Citron colour, with a Cream ſwimming in it or fixed to the ſides of the Glaſs, from whence an *indicium* is taken, that the Blood doth abound with ſaline rather than ſulphureous Particles: Indeed if ſuch an Urine be exhaled at the fire, the ſaline reſidence will remain in almoſt the double quantity of the Liquor. Moreover, ſometimes the Urines of the Sick are changed from this or that ſtate to the contrary, ſo that what was to day red or of a Citron colour; to morrow is made limpid, clear, and thin, and in abundance: Which kind of Piſs, as it appears, was not circulated long with the Blood (becauſe it hath received no tincture from it) we judge to come to paſs from the watry recrements of the Blood and nervous juice, contained partly within the Lymphæducts, and partly depoſited within the Pores and paſſages of the ſolid parts, which when they are gathered together to a fulneſs, every where run forth of their Receptacles with the riſing flood, and ruſhing into the bloody Maſs, are from thence ſent away preſently by the Reins.

A plentiful ſpitting and ulcerous Affections of the Mouth.

9. There follows upon this Diſeaſe being grown very grievous, a plentiful ſpitting, and for the moſt part a bloodineſs of the Gums, and then a looſeneſs of them and at length a putrefaction, which is wont to be accompanied with an Eroſion, Looſeneſs, or falling out of the Teeth, and with a ſtinking Breath: That the reaſon of which may the better appear, in the firſt place, you are to be advertiſed, that there are ordained about the peculiar parts of the mouth, certain Pipes or paſſages, to wit, ſalival, by which the ſerous humours are plentifully ſent forth: Theſe ariſing from various Glandula's, to wit, the *Parotides* being in the Weſand or Throat, the Maxillar for thoſe belonging to the Jaws, and thoſe under the Tongue for the moſt part terminate about the Gums or near them: The conſtant and ordinary Office of theſe, is to lay up the Spittle for ſome neceſſary uſes in the Cavity of the mouth. Beſides, it is obſerved, that the ſuperfluous humours, yea the more

more thick and vicious, are perhaps ſent away forth adoors by this way, rather than ſeparated from the Blood as by Urine, Sweat, and otherways. Quickſilver prepared with Salts and taken inwardly, or the Body anointed with it, is minutely diſſolved by the ſaline Particles of our Body, and being with them involved, mixes it ſelf moſt deeply: Theſe kind of Concretions of Salts and Mercury, being diffuſed thorow all the humours, and into all the parts of the whole Body, as Nature endeavours to expel the trouble they afford; the beſt and indeed moſt eaſily performs their execution, by theſe emunctories of the Mouth: For the Blood, and perhaps in ſome part the nervous Liquor being burthened with thoſe mercurial-ſaline Recrements, endeavour by every way to ſhake them off; which however, when they are more thick and fixed, than that they can be exhaled or diſtilled forth by ſweat, or ſent away, being precipitated by the ferment of the Reins through the Urine; they are ſometimes breaking thorow the little mouths of the Arteries, inſerted in the Inteſtines, in ſome part excluded by the Belly: But yet the particles of this Medicine being involved with the *Serum*, and moſt readily depoſited in the aforeſaid Glandula's, and in others belonging to the Mouth and Throat, flow out by ſalivation more plentifully excited; by which effluxion it happens that the Gums and other parts of the Mouth are ulcerated, and the Teeth are looſened with a ſtinking of the Mouth. But this kind of ſalivation ſometimes ſucceeds of its own accord, inſtead of a *Criſis* without *Mercury*, in the declination of ill judged Fevers, and the humour to be excerned, ſweating forth not only from the more open holes of the ſalival paſſages, but alſo from the little mouths of the Arteries every where thick planted, daub over the Cavity of the Mouth with a whitiſh ſcurf. The like reaſon as of theſe accidents, may be rendred of theſe ſort of Symptoms in the Scurvy: For indeed when in a depraved Blood, more and thicker recrements of the enormous Salt and Sulphur are gathered together than can be excerned by evaporation or by Urine or Seige, they are carried to the emunctories of the Mouth; by which the more ſalt purgaments of the Blood are wont to go forth; theſe ſalt things being diluted with the *Serum*, ſweating not only from the ſalival Veſſels, create great ſpitting; but alſo being carried thorow the Arteries, enter into the ſoft and ſpungy fleſh of the Gums, which firſt of all, their pores being filled with an ichorous Blood, ſwell up; but afterwards the ſalt Ichor going forth from the Blood, and being continually excreted, the fleſh of the Gums, by reaſon of the defect of laudable nutriment, grows flaggy, leaving the Teeth almoſt naked. Further, by a long afflux of matter plainly corroſive, the fleſh of the Gums is eaten away; ſo that the Teeth can hardly ſtand, but grow looſe or fall out of the corrupted Stalls: And by reaſon of the ſaline-ſulphureous Particles, partly of the excreted humour and partly of the putrefying Gums, being continually breathed forth, the filthy ſtinking ſmell of the mouth is excited.

Various Spots and Whelks.

10. Spots breaking forth in the Thighs and in other parts of the Body, are accounted a pathognomick ſign of the Scurvy: Theſe are ſometimes about the bigneſs of a Penny, and often as big as a Shilling; ſometimes the Skin ſeems to be marked or ſpotted an hands breadth or more in ſome part: Beſides theſe Spots are of divers colours, to wit, now Citron Colour, now Dark, now Purple, and ſometimes appear livid, blewiſh or black: Beſides ſome have whelks variouſly ſwelling, *viz.* now lightly, now with a hard, and as it were a cruſty skin, or they break out with ſcales here and there in all the members of the Body: Among the ſpots and breakings forth whether tumid, or equal, or rough, this difference is noted in general, *viz.* that theſe contain a matter not congruous with the Blood, wherefore being ſecreted from its Maſs in its circuit, they are fixed in the Skin; neither are they altogether forſaken by the Blood, but that the Blood paſſing by adds to them others and new Particles, whereby it comes to paſs that the extravaſated matter, by the continual approach of the Blood, is either at length ſupp'd back again, or being ſubtiliſed is breathed forth, (and ſometimes it is effected partly one way and partly the other) or laſtly that matter being ripened, runs into an Ulcer or Sore. Moreover, Whelks almoſt of every kind do generally happen not only in the Scurvy, but in many other Diſeaſes, yea if at any time the Blood does immoderately boyl up through any occaſions. But ſpots are portions ſecreted from the Blood and every where forſaken by it; ſo that there is nothing of commerce between them and the circulated Blood, wherefore they increaſe not in bulk, nor ſuppurate, nor eaſily evaporate. The Citron or darkiſh Spots ſeem to be ſome portions of Choler or Melancholy,

melancholy poured forth from the Blood into the Skin: But as to the black or Purple marks, it is to be known, that they are not excited in any other diſeaſes, beſides peſtilential Fevers, the venereal diſeaſe, and the Scurvy: In the Plague and malignant Fevers they ſeem to be certain rejected parts of the blaſted and deadly affected Blood, to which always a malignity and Contagion are joyned, as we have elſe where ſhown more at large: In the Pox and Scurvy, though there is not ſo much malignity found, that the Spirits of the Blood are greatly mortified, or that its liquor becomes ſo greatly blaſted, yet we may well ſuſpect, that in either diſeaſe, growing grievous, the Blood being apt to be in ſome meaſure broken and coagulated, it grows together into leſſer Clotters; which ſort of Concretions of the Blood being extruded at the mouths of the Arteries, are fixed in the Skin, and according as theſe portions are greater or leſſer, and participate more or leſs, of the corrupted Blood, the Spots alſo, as to their bigneſs, and colour, are fixed in the Skin.

The Flux of the Belly.

11. A Flux and looſneſs of the Belly happens frequent enough in the Scurvy, ſo that the *Fæces* of the Belly, which are ſometimes liquid and ſometimes compacted, and of divers Colours, ſeem to exceed in quantity the aliment that is taken in, which ſort of Flux, although it appear immoderate if it be ſtayed by the uſe of Medicines, preſently the Sick are wont to find a ſwelling of the Ventricle and *Hypochondria*, a hardneſs of Breath, or a waſting of the Spirits. The cauſe of the ſcorbutick *Diarrhœa*, is partly, that the Chyle is not rightly cook'd, neither is it ſoon enough, or ſufficiently born through the milky Veſſels; hence ſtagnating in the Inteſtines and becoming degenerous, is caſt forth a doors, but this chiefly happens, for that the impurities admitted within, from the bloody Maſs, drop out from the little mouths of the Arteries, wherefore the things excreted are more copious ſometimes than thoſe put in.

Vomiting, nauſeouſneſs, &c.

12. By the like reaſon, Scorbutick and Hypocondriack perſons are found obnoxious to frequent Vomiting, nauſeous Belching, and heart pains: which Symptoms indeed do frequently happen in this Diſeaſe, partly, becauſe the Tone of the Stomach is looſned, and its Ferment vitiated, whereby it comes to paſs, that the reliques of the Chyle evilly concocted, is turned into auſtere Salt, Vitriolick, or otherwyas degenerate pulp, and beſides, though the Stomach be ill, becauſe the recrements of the Blood reſtagnating within, are poured into its Boſome.

Dyſenterie and Hæmorrhagies.

13. Sometimes a dyſenterick Affection, alſo frequent hæmorrhages or flowings of Blood at the Noſe, the Fundament, Reins, *Thorax*, Gums and other places, follow thoſe ſick of an inveterate Scurvy: The cauſe of which Symptomes is, for that the Blood being made more ſalt, and therefore more apt to grow hot, eaſily breaks forth at the mouths of the Veſſels; but chiefly, becauſe when the tone of the ſolid parts is weakned, and that the Fibres are made very lax, the mouths of the Veſſels become broader and diſcontinued, ſo that it does not rightly lead the paſſages from the extremities of the Arteries into the little mouths of the Veins, but that the Blood being intercepted between the openings of the Veſſels, and being there apt to ſtagnate and flow out, by what it can, it eaſily breaks forth, and ſlides it ſelf forth a doors.

Theſe are the chief Symptoms, which are wont to be inferred by the Scurvy, by reaſon of its taint; being impreſſed on the maſs of Blood, and from thence tranſlated immediately into other parts, ſome of which alſo happen to be cauſed, partly by the depravation of the nervous Liquor. Now we will next conſider of the Effects and Accidents of this Diſeaſe, which are wont to be excited, almoſt only or chiefly by the fault of the nervous Juice.

CHAP. IV.

The Symptoms and Accidents which are wont to ariſe in the Scurvy, by reaſon of the Taint impreſſed on the Brain, and nervous Stock.

Fearfulneſs and languor of the whole Body.

1. WE have already intimated, that in the more grievous Scurvy, the moiſtning Liquor of the Brain and nervous appendix is wont to become thinner and poorer, whereby it comes to paſs that moſt of the animal Functions are performed untowardly and ſlowly, hence the locomotive power flaggs very much, ſo that the ſick loving Idleneſs and eaſe, ſhun exerciſes and labors of the Body, go about unwillingly any Task, and preſently being weary give it off. I have known in ſome the whole ſenſitive Soul to ſeem leſſned, and as it were made unequal for the Body, ſo that the ſick, believing themſelves not able to walk, nor ſtand; have refuſed altogether to be raiſed, or to riſe from their Beds; when as yet no evident cauſe did hinder, but that they were ſtrong enough to do what was required: Beſides ſuch, however ingenious they were before, abhorred the Studies, and labours of the Mind, and plainly affected to wear out their Life by doing nothing.

Melancholy.

2. In an inveterate Scurvy the nervous Juice declines from a ſpirituous-ſaline diſpoſition towards a ſour one; hence, as we have elſewhere ſhown, Melancholy, a fluctuation of the mind, an often mutation, and inconſtancy of purpoſes, proceed: moreover, as the nervous Fibres are perpetually watered by the influx of ſuch an humor, from hence, in ſome part, come the more light Spaſms or Twiches, cramp-like contractures, and wandring Pains. But indeed, the cheifeſt vice of the nervous liquor, is wont to be, that being ſtuffed with filths and fæculencies, it contains heterogeneous particles, and divers ways hurtful to the animal regiment: wherefore happen very often to Scorbuticks horrid and grievous Affections, of which ſort, are the following Symptoms.

Scorbutick Palſie.

3. Paralytick Affections, *viz.* Impotency, or the reſolution of one or more of the Members, alſo ſtupor, or lack of feeling, and a ſenſe of tingling, or pricking, often follow upon a deep and heavy Scurvy: which ſort of Symptoms are not however, for the moſt part, very much fixed and permanent, but ſometimes they ceaſe or remit, and anon are repeated or increaſed. The ſcorbutick Palſie is wont to be excited chiefly from three ſorts of cauſes, which now conjunctly now diviſively produce this Diſeaſe. 1. For the Debility, or reſolution of the Members happens, becauſe of the nervous Juice being departed, there wants a ſufficient plenty, or ſtock, of the animal Spirits, whereby all the members ſhould be actuated: Hence, the ſick have the locomotive faculty flagging, or weak, as if infeebled by old age, about the thighs, and feet, and ſometimes in other extream parts, to which the influx of the Spirits doth not plentifully reach: perhaps afterwards, as greater afflux of the Spirits is carried to the affected Member, and is in the mean time elſe where deficient, the diſeaſe ceaſes, or is transferred to another place. 2. Sometimes the animal Spirits, although they are plentifully and ſufficient enough, in the parts, yet they are infected with Heterogeneous, and as it were narcotick particles, brought along with the nervous Juice, ſo that being as it were bound, and almoſt overwhelmed, they are not able ſufficiently and nimbly enough, to perform their exploſive endeavours, or labors: hence ariſe not only the impotency of the motive faculty, but alſo a certain depravation of the ſenſitive, *viz.* a benummedneſs, and a ſence of ſtinging, tingling or pricking: for that, whilſt the animal Spirits are loaded with an incongruous *Copula*, their irradiation, like the beams of the Sun, paſſing thorow a cloudy air, is performed, but refractedly, and diſturbedly. 3. Although the animal Spirits are diſpenſed in a ſufficient plenty, and are free and clear of any narcotick quality, yet oftentimes their paſſages are obſtructed, ſo that the Commerce between the inflowing Spirits and thoſe implanted within ſome members,

From 3. ſorts of Cauſes.

cannot

cannot be performed conveniently; for it ſometimes happens, that the more thick and earthy Particles do enter into the bodies of the Nerves with the moiſtning Juice; which ſo ſtuff the paſſages, about the enfoldings of the Nerves and other nervous windings, with their full burthen, that the irradiation of the Spirits in this or that member is wholly hindred. So I have known ſome, who have had a hand or foot wholly enfeebled or reſolved, whilſt the arm, or thigh, with the reſt of the Body was well.

Pains, of which there are ſeveral Species.

4. From the like cauſe, *viz.* ſcorbutick Fæculencies, fallen upon the Bodies of the Nerves, Griefs or Pains alſo, which are eſteemed the moſt frequent Symptomes of this Diſeaſe, do in ſome ſort proceed; But as they are of a divers kind, they alſo ariſe ſometimes from other Cauſes. For indeed, the ſcorbutick Pains are either more light, uncertain, and quickly paſſing away, which depend ſometimes upon a *Flatus*, or Wind diſtending the Membranes, and ſometimes on a ſharp or Salt matter, poured forth, now from the Blood, now from the nervous Juice, upon the nervous parts; which kind of matter, for that it is improportionate to the nervous Fibres, pulls or hawls them, and irritates them into corrugations or wrinklings and becomes painful: but, for as much as the ſame is quickly waſhed off by the flowing of the *Serum*, or diſſipated by heat, the troubleſom ſenſe brought in from ſuch a cauſe is more eaſily removed. Or in the ſecond place, the ſcorbutick Dolors, are more grievous, very acute, and hard to be moved, which ſort alſo, are either fixed, or determinated to ſome particular place, or wandring transfer the Pain, and that moſt grievous, from one place to another, as may be perceived in a wandring and Scorbutick Gout, and Rheumatiſm, concerning which we ſhall diſcourſe hereafter: In the mean time, fixed Pains and a long time remaining, are wont to be excited in divers parts, but chiefly in the Belly, Loyns Thighs, *Sternum* or Cheſt, and in the Head: It will be worth our labour, briefly to deſcribe the Pathologie belonging to every one of theſe places.

1. An almoſt continual Pain of the Belly.

1. The pain of the belly is ſo familiar to the Scurvy, that according to the German *Idiom*, it ſhould take from thence its name. This Symptom, though in a lighter degree, almoſt continually afflicts ſome ſick perſons, to which is joyned now a looſneſs, and now a high binding up of the Belly: the reaſon of which ſeems to be, for that, when both the Blood and nervous Juice abound with impurities, both the Arteries and Nerves carry the plenty of excrementious matter towards the ſink of the Belly, which being fixed about the Coats of the Meſentery, or the Inteſtines, ſtir up conſtant Pains, by a perpetual pulling the nervous Fibres. But beſides there happen to ſome ſcorbutical perſons, Paroxyſms or fits of very acute Pains, as it were Colical Affections, which being protracted for many days, yea ſometimes weeks, miſerably torment the ſick: ſo that they think their Bowels to be pulled, and torn to pieces with the grievouſneſs of the Pain: theſe pains are wont hardly to be allaied with any remedies, unleſs with the more generous Opiates; and as ſoon as the virtue of the Hypnoticks is conſumed, they are repeated with their wonted Cruelty, but continuing with a longer fit, very often torments in the Loins and Back are propagated and at length are diffuſed on the members of the whole Body: to this ſort of affection a Palſie does not ſeldom ſucceed. But then in reſpect of the Cauſe of the Scorbutick Colick, it is not probable that it ſhould ariſe from a ſharp matter, depoſited within the Cavities of the Inteſtines, neither from any ſimple humor, however miſchievous it be impacted in their Coats: for this is quickly ſhaken off, or goes into an Ulcer, beſides that is eaſily exterminated by the uſe of Clyſters, or Purges: but indeed, theſe cruell torments of the Belly can come from no other cauſe, than the mutual ſtrivings and effervеſcencies of the Salts (which are of a divers Nature) fighting or ſtrugling together, whereby truly the Nervous Fibres are pulled, and as it were torn aſunder. For we may ſuppoſe, that certain ſour recrements of the nervous Juice, like to vitriolick *Stagmas*, being gathered together about the foldings of the Meſenterie, or other nervous parts of that region, to which comes a ſerous *Colluvies* from the arterious Blood growing hot, abundantly ſtuffed with the particles of a fixed, and as it were a lixivial Salt, and with thoſe ſwellings up produces as it were piercing Pains. From hence it may be argued that the mine of the former morbid Stock deſcends from the Head, by the paſſage of the Nerves, into the lower Belly, for that great headaches, alſo the Vertigo and Swimming, or turning round in the Head often præceed, and not rarely ſucceed this kind of Colick.

2. Pains as it were of the Colick.

The cauſe of them.

Beſides, it appears that from the Bloody Maſs there is a large ſupply ſent of particles of fixed Salt, paſſing as it were by *Deliquium*, or a ſtraining thorow; becauſe the fitt of this Diſeaſe being very urgent, the Urine of the ſick appears of a deep colour, and is very much ſtuffed with Salt, and is as it were lixivial, and oftentimes its ſuperficies is variegated with divers Colours, like the train of a Peacock: But ſo ſoon as the Diſeaſe begins to decline, the Urine is better, and from hence they are wont to aſſume hope and ſigns of growing well. But that this affection of the Belly is often propagated into the Loins, the reaſon is becauſe the nerves of the Loyns and the meſentery intimately communicate, and in very many places are mutually inoculated: wherefore when the dolorifick matter ſuperabounds in the paſſages of theſe, it eaſily paſſes into the neighbour proceſſes of thoſe: But then that the Diſeaſe increaſing, the pains being diffuſed thorow the whole Body, almoſt every Joynt and Member are afflicted, the reaſon is, becauſe when a more plentiful proviſion of the morbid ſeed is begotten in the head, than can be derived to the whole ſtock of the firſt affected Nerves, *viz.* the moving and intercoſtal pair; part of it entering into the Bodies of the other Nerves, and alſo ſpinal Marrow, ſpreads abroad this morbifick mine, participating of acetous Salt into very many parts of the whole Body, which every where by the acceſſion of the fixed Salt, from the bloody Maſs becomes dolorifick: and laſtly, after that the plenty of Spirits is profligated by the incongruous matter, the reſidue after the mutual effervescencies of the Humours, being in very many of the Nerves together beſet, and mightily filled or ſtopped up, the waies of Emanation are obſtructed, and their mutual commerce is broken off, ſo that 'tis no wonder if thoſe long Pains end at laſt in a Palſie,

Pains in ſeveral parts of the Abdomen.

not only in the middle of the Belly, where the morbifick cauſe ſeems to ſubſiſt, about the foldings of the Meſenterie, but in other places round about, Pains not inferior to the Colick, are wont to ariſe. I know a noble Maid that was obnoxious to moſt cruel Torments, near the *os Pubis*, during about the ſpace of a Month, and were wont to be repeated upon any occaſion, given without any ſuſpition of the Stone, or Ulcer in the urinary Paſſages: which kind of affection I judge to depend upon a morbid matter impacted in the nervous foldings, planted in the *Hypogaſtrium*. Further, it is familiar to ſcorbutical Perſons, to find fits of very cruel Pains, ſometimes in the right, ſometimes in the left *Hypochondria*, and ſometimes about the Region of the Ventricle: the cauſes of which we think to ly hid in the nervous foldings belonging to the *Viſcera*, planted in that place.

In the Loins and Back.

2. Scorbutick Pains, are wont ſometimes to infeſt the Loins, and alſo the Region of the Back, now above, now below, without any prævious Affection of the *Abdomen*, or of the Reins. I have known ſeveral keeping their Beds with ſuch a Diſtemper, perpetually crying out Day and Night, by reaſon of the intollerable torment: The cauſe of this kind of Paſſion may be aſcribed to the acetous Recrements of the nervous Juice poured on the Membranes, and Tendons of thoſe parts, and ſo ſtirred up into effervescency, by the acceſſion of the Sanguinious ſaltiſhneſs.

In the Breaſt and Pleura.

3. By reaſon of the ſame conjoyning of Salts, affixed on the Membranes, Cloathing the *Præcordia*, very troubleſom Pains about the region of the Breaſt, and not eaſily to be removed, are often induced; hence the Baſtard pleuriſie is ſo frequent a ſymptom of the Scurvy. I have known many ſcorbutical perſons very much troubled for a long while, with a moſt grievous Pain under the *Sternum*, ſo that in ſeveral ſo affected, I could not but think there was ſome Ulcer, or abſceſs lying hid in the *Mediaſtinum*; when in truth this ſymptom did depend only upon the heterogeneous matter, brought thither, partly by the Nerves, and partly by the arteries, and there growing hot, being affixed to the Membranes; as the event often proved: for that the ſick were freed, by the long uſe of antiſcorbutick Remedies.

In the Head.

4. Hitherto we have recounted the chief kinds of Pains, infeſting the middle parts of the Body. But in the Scurvy there is felt thoſe no leſs troubleſom, in the extream parts, *viz.* the Head, Thighs and Leggs. As to the firſt, Headach is ſo rarely wanting to this Diſeaſe, that many by this effect are ſatisfied chiefly that it is the ſcorbutick Venom; by which they become obnoxious to moſt grievous fits of this evil, and handled for a long time, and oftentimes repeated. The cauſe of this is obvious to every one, that it may be aſcribed to the humours poured on the *Meninx* or Films inwrapping the Brain, which alſo Anatomie hath proved.

For

For the Skulls of ſome of the dead being opened, I perceived both the membranes grown together, and every where ſet thick with little Whelks, and ſcirrhous tumors, which kind of tumors and concretions, ſeem to have riſen from the mutual coagulations of the two-fold painful humour, after many effervеſcences.

5. Nor indeed is it any otherwiſe to be determined, as to the Pains moſt grievouſly afflicting the Thighs and Leggs of the ſick, chiefly in the night time: for many labouring with an inveterate Scurvy as ſoon as ever they are warm in their beds, are wont to endure intollerable torments, about the calves of the Leggs, Shins and Thighs, and ſometimes about other parts, ſo that they cry out their fleſh is gnawn, or torn in pieces like the biting of Dogs: Theſe tortures if they leave their Bed, do ſomewhat abate; otherwiſe the afflicted are moſt miſerably tormented all Night long: In this caſe there can nothing be more aptly conceived, than the acetous recrements of the nervous Juice, to fall down on the Leggs, as into a place having a great declivity and to be copiouſly affixed to their Membranes, to which whilſt the rejected Salts do come from the Blood notably rarefied and agitated, thorough the heat of the Bed, and do ferment with theſe after the manner of Salts, therefore indeed from the mutual ſtriving and effervеſcency of the Particles of divers kinds, the nervous Fibres being pulled and hawled beyond meaſure, run into painful Corrugations, neither do indeed theſe dolorifick Pains ceaſe or remit, till the particles then gathered together, either evaporate or by their mutual wreſtling being brought under are worn out, are quiet from their effervеſcencie; but then within a little ſpace, freſh proviſion of either matter diſpoſes to a new paroxyſm, by reaſon of the mutual effervеſcencie and coalition. Of theſe kind of Salts of a diverſe kind, proceeding from a twofold humour, the wandring Gout, the Rheumatiſm and certain other affections are produced, which we deſervedly impute to the conjunct dyſcraſies, and as it were evil confæderations of the Blood and nervous Juice. Moreover in the ſame Claſs certain ſpecies of ſcorbutick Pains but now handled, ought to be placed; but becauſe they are of kin to other Pain, ariſing from the Sole Vice of the nervous Juice, or of the Blood, therefore we have here joyned together the divers Theories of the dolorifick Affections. *In the Thighs.*

As there is a conflux of Symptoms of a divers kind in the Scurvy, ſo there is begotten a manifold morbifick matter, and of a divers nature: *viz.* Heterogeneos particles coming into the Brain and nervous ſtock, with the moiſtning Juice, are ſometimes narcotick, bringing forth the Palſie and ſometimes ſaline, cauſing Pains, (as we have ſaid) alſo ſometimes they are nitro-ſulphureous and exploſive, from which the ſpaſmodie or cramp-like affections ariſe: but by reaſon of particles of this ſort go together in the Brain, there happen to ſcorbutical perſons, Vertigos, ſwimmings in the head and outragious aſſaults, like the falling ſickneſs: From the like cauſe, poſſeſſing the nervous Stock, proceed convulſive motions, tremblings, ſhakings, and very often horrid contractions in the *Viſcera* and in the Members. We have already ſpoken largely enough of the nature, differences and cauſes of Convulſions. Beſides we have fully deſcribed certain admirable caſes of this affection, ariſing from the ſcorbutick infection, ſo that it ſeems needleſs to diſcourſe any more of this matter, for it may be eaſily accommodated by the hypotheſis before delivered, to all the ſpaſmodick ſymptoms of the Scurvy whatſoever.

6. Thoſe labouring with an inveterate Scurvy are very obnoxious to a Vertigo: Concerning this affection, and alſo of many other Cephalical, we have made ſpeal diſquiſitions, which may perhaps be ſometimes be made publick. In the mean time we will in one word ſignifie that this Symptom ariſes, for that the animal ſpirits are in ſome meaſure perverted from the wonted ways of their expanſions, to wit, being either hindred on otherways driven from their ſeries, ſtate, and orders are compelled to break off: this happens to come to paſs as in other caſes, ſo chiefly in the Scurvie eſpecially for two cauſes, either for the one, or the other, or for both together; *viz.* either becauſe the commerce of the Spirits is obſtructed ſomewhere, in ſome paſſages and Pores of the brain, being poſſeſſed by ſome extraneous gueſt, or ſecondly, ſome companies of the Spirits, being burthened with an heterogeneous *Copula*, or joynting are compelled to ſtay behind the reſt, or to go out of their tracts: In this Diſeaſe the liquor indeed inſtilled to the brain from a very impure blood, brings with it very many Fæculencies, by which it can be no otherways, but that the heterogeneous particles ſhould every where ſtuff up *The Vertigo.*

the

the Pores of the Brains and growing to the animal Spirits, oppoſe them or force them into exploſions.

Sleepineſs. 7. Almoſt for the like cauſe, ſleepineſs and torpor, or heavineſs frequently happens to Scorbutick perſons, *viz.* for as much as the animal Spirits being burthened with watery or narcotick Particles, and very much oppreſſed, cannot perform readily their expeditious and quick motions within the Brain very much alſo abſtructed, neither continue long the acts and exerciſes of their functions, but love to ly down and to indulge themſelves with idleneſs and reſt. Moreover, this ſort of affection ſometimes is ſtirred up by the defect and want of the animal Spirits; for from the Blood very much vitiated and as it were dead, the Brain and nervous Stock is ſupplied but with a thin Liquor, and almoſt lacking of all *Vigor*: From ſuch a *Prophaſis* or occaſion, I have known a Lethargie excited in thoſe about to dy; by which the affected though they ſeemed to indulge themſelves with a continual ſleep, yet being called are wont to know thoſe ſtanding about them, and to anſwer thoſe who ſpeak to them; but the ſtore of the animal Spirits growing weary, they were neither able to wake long nor to attend to diſcourſe. When I have opened ſuch who were overwhelmed with perpetual ſleep, I have found the Brain dry enough and altogether free from a Dropſie, or ſerous *Colluvies*, with which lethargick perſons are wont for the moſt part to be affected.

And waking, But ſometimes on the contrary, ſome ſcorbutick perſons are moleſted with almoſt continual waking. Which kind of Symptom proceeds ſometimes from the affections of the mind, Grief, convulſive Paſſions, fear of Swooning, paſſions of the Heart, and alſo from the perturbations of the Stomach and of other *Viſcera*; for as much as the Spirits being vehemently moved in every part of the ſenſitive Soul, their whole Hypoſtaſis is detained from entering into reſt, or a tranquil condition. For I have known ſome touched with a ſcorbutical Taint, who though they were free from Pains or Spaſms, and alſo clear from any immoderate affection of the mind, have been induced to watchings day and night for many weeks, and oftentimes could get no ſleep, though they had taken ſtrong opiates: In the mean time they continued lively enough and ready to the performance of Labours, without any heavineſs of the Head, and without any torpor or ſluggiſhneſs of the mind or ſenſes, as if they had wanted no ſleep. The reaſon of this ſeems to be, that ſometimes together with the nervous Juice, certain nitro-ſaline Particles of a fierce and unquiet nature, (of which ſort are the effluvias falling from *Aqua fortis*, or the ſpirit of nitre) growing to the Spirits, compell them to be perpetually agitated and to be continually in motion: for even as Vapors breathing forth from ſtygian Waters, are never altogether fixed or at reſt, ſo the heterogeneous Particles which are of that ſort of Nature, adhering to the Spirits inhabiting the Brain, ſuffer them ſcarce ever to be idle or to indulge ſleep. Theſe are the chief ſymptoms that are wont to be ſtirred up in the animal regimen, by reaſon of the ſcorbutick taint being impreſſed on the moiſtning liquor of the Brain and Nerves; which with thoſe before mentioned happen by fault of the Blood, degenerating from its right *Craſis*. But as to thoſe great and Herculian Diſeaſes, to wit, the aſſaults of the Apoplexie and the Epilepſie, which ſometimes happen to ſcorbutical Perſons: In theſe caſes the former affection, being as it were married to another more worthy looſes it name, and paſſes into the Pathology of that, as it were into its Progeny, laſtly we will inquire what are the ſymptoms of the Scurvy by reaſon of the conjunct Dyſcraſies of the Blood and nervous Juice, as it were joyning their alliances in Evil.

CHAP. V.

CHAP. V.

Of the ſymptoms of the Scurvy which ariſe by reaſon of the Conjunct Dyſcraſies of the Blood and nervous Juice.

IN this rank, in the firſt place is ſet the ſcorbutick Atrophy or conſumption of the Fleſh: for who labour long with this Diſeaſe often fall into a *Maraſmus* without any ſignal fault of the Lungs, or ſuſpition of a Conſumption or *Phthiſis*, ſo that the Fleſh wholly falls away, and the Skin becoming very flaggy, ſcarce ſticks on the Bones. The cauſe of which ought not only to be attributed to the fault of the Blood degenerating from its right *Craſis* or diſpoſition; for this however depraved it be, for the moſt part aſſimilates ſome portion of the nutricious Juice, and beſtows it on the parts to be nouriſhed: but indeed when as the nervous Juice is alſo bad, the nutritive faculty is altogether inhibited; for that by the defect or fault of this, the nutriment elaborated by the Blood becomes altogether unprofitable and unfruitful: By what means, as to nutrition, either Liquor, to wit, the Sanguinious and nervous diſcharge themſelves, we have elſe where ſhewn. From that hypotheſis, which ſeems to be built upon ſufficiently probable reaſons, it eaſily follows that the Atrophie familiar to the Scurvy depends from the conjunct irregularities of either nutritive faculty. For as much as the Blood gives only vicious aliment, and that the nervous Liquor fails in the actuating and aſſimilating it, there is a neceſſity for the ſolid parts, being continually defrauded of their food, to wither away. *The Scorbutick Atrophy.*

2. The ſcorbutick Gout, which is very much wandring, and affects now this Part now that ſucceſſively, now more parts together, and leaps about from one place to another, or from theſe places to thoſe, ſeems to depend upon a double Stock, even as the Colick above deſcribed, but the manner altogether inverted. For indeed it is to be ſuppoſed in this Diſeaſe, that very many heaps of the fixed Salt, from the bloody Maſs are diſpoſed here and there about the Members and Joynts as ſo many Neſts: which indeed being hid within ſo many diſtinct Cells, remain as the Eggs of Fiſhes, or as the feminine Seed, to which afterwards the acetous ſour recrements of the nervous Liquor come as the maſculine Seed, and renders them fertil, to wit, in as much as the Salts of a divers nature, being commixed, they greatly ferment or grow hot; and ſo by the mutual wreſtling and agitation of the particles, the Membranes and nervous Fibres being notably hauled, they are carried into dolorifick Corrugations. In truth, it from hence appears that the firſt mine of this diſeaſe as alſo of the common Gout, is to be placed in the bloody Maſs, and to be actuated by the Recrements of the nervous Juice, becauſe when the aſſaults of the Pains ariſe in various parts together, or ſucceſſively, the Blood ſeems not to grow hot above the meaſure, nor its ſalſaments paſſing by *Deliquium* at that time flow out more plentifully; for that neither the Pulſe becomes quicker nor the Urine lixivial. But in an urgent fit, very often a foregoing Headach, an heavineſs of the Head or Vertigo, inquietude of the Members and often a leaping of the Tendons, which ſort of Symptoms often præcede or accompany the aſſaults of pains, argue the ſour recrements of the nervous Juice to ſuffer a flux. To this appertains that the acid liquors being drunk up, provoke the gouty Paroxyſms. In the Scurvy indeed either Mine is more plentifully begotten, the neſts of the Gout are longer publiſhed, and the pains in theſe do ſpring ſooner by far: beſides from a very impure Blood, a ſaline or tartarous matter is heaped up not only in the Joynts of the Feet or Thighs, but almoſt every where about the membranes and the interſpaces of the Muſcles, to which alſo an acetous *Copula* or joynting being poured out in many places from the nervous Juice, it becomes fruitful of Pains; then for as much as either Mine conſiſts in a matter leſs thick, and is gathered together in open places, it is either waſhed away in a little time by the *Serum* flowing to it, or it is diſſipated by heat, or elſe being ſucked again by the Blood, it is transferred to ſome other place. *The wandring ſcorbutick Gout.*

3. The

3. *The Rheumatism.*

3. The Rheumatism, as it is described by modern Authors, often comes upon an inveterate Scurvy. Which sort of affection, exciting Pains almost in all parts of the Body, one after another, although it appears like to the wandring Gout, but now described, yet it differs from it both in respect of the pains, which in a Rheumatism quicklier pass over, and oftner change their seat, and that with them are very often joyned a small Fever, and a tumour of the affected parts, and a *phlegosis* or Inflammation; as also by reason of the conjunct Cause, which indeed being of Kin to that which brings forth the scorbutick Colick, is clean contrary to the cause of the wandring Gout: For it seems that in the first preparation of this Disease, an acetous Mine is deposited in very many places from the nervous Juice, as it were the female Seed; to which sort of Symbols left in divers places here and there, whilst that the blood growing hot, pours forth its plentifully rejected saline reliques, presently upon the wrestling and Congression of dissimilar Particles. Pains are caused moreover, because the recrements of the Blood being expoled in the middle of its Course, they something hinder its motion, therefore a tumour and Inflammation is brought upon the part affected then, because the Blood at last licks up again the Matter, but now rejected by it self, and transferrs it to some other place, those often shiftings and mutations of Pains happen. This Affection deserves a peculiar consideration: but this may suffice to have said these few things of it in general, to wit, as it is a symptom of the Scurvy.

Hitherto we have unfolded the Symptoms of the Scurvy, arising from a threefold kind of Cause, the Pathologie of which contains in it self other manifold Affections, and very different in themselves: of which it is worthy to be observed, that as many Diseases, belonging to the Brain and nervous Stock, which exist very often alone and of themselves, come also upon the Scurvy; yet as to their formal reasons and as to the method, to be observed in the curing of these or those, a very great difference occurs. But when a Palsie, Vertigo, Convulsion, Lethargy, and other Diseases of that kind happen of themselves, they always depend upon a more fixed cause, and very much on some notable fault of the Head and nervous Appendix; and as Cephalick remedies and appropiate to those Diseases only, are convenient, yet the success does not easily nor alwais answer to their Wishes. In the mean time either little care is taken for the Emendation of the Blood, or if it be, for the most part it is in vain: But when these affections are brought in by the Scurvy, there is less danger, and although they have oftner fits, yet they more easily pass away; but the cure of the Disease is performed more happily by Antiscorbutick Remedies than by Specificks and by reduction of the Blood to a due *Crasis* or Complexion, rather than by administring any thing to the evils of the Brain and nervous Stock. The same observation is to be had in Tumors, Ulcers, the Dropsie and many other Distempers brought in by the Scorbutick infection, which otherways when excited by themselves, are healed only with antiscorbutick Remedies. The reason of which is, that in the Scurvy, the conjunct cause of the Symptoms and of very many Affections, consists for the most part only in the humors, to wit, in the Blood and nervous Juice, and not in the solid parts, *viz.* the *Viscera*, *Præcordia* and Brain, wherefore when their Dyscrasies or evil dispositions may be more easily mended, then the evil formations of the other Diseases of this kind, are more certainly and easilier or with less trouble cured, when excited by reason of the Scurvy than when they come to themselves. But when the Disease is more deeply rooted, and that the principle solid parts are hurt, (as it many times happens) *viz.* when the recrements of the Blood and nervous Juice, being impacted for a long time in them hurt their Tone, stuff their Pores and Passages, and bring forth in them Scirrhous Tumours, very often, or Ulcers; the aforesaid Symptoms, although imputed only to the Scorbutick Taint, seldom or never admit of a Cure, and by reason of this invincible Cause, at last the Scurvy it self becomes desperate and deplorable.

How the Diseases differ being excited by themselves, and brought on by the Scurvy.

CHAP. VI.

The Prognosticks of the Scurvy.

The Prognosis in the Scurvy ought not to be without consideration.

WHen in the scorbutick affection very many and sometimes very cruel and horrid symptoms together are wont to oppress, there is expected a *prognosis* from the Physician: Yea he himself, that he may the better institute the method of Curing, carefully weighs what may be the future event of the Disease: Notwithstanding Judgments in this case ought to be cautious, a long while suspended and not too rash, for very many (as have fallen under our observation) esteemed desperate, have grown well. I have knows some whom a a frequent and horrid *Asthma* had already seemed to have choaked, others continually dying with frequent swooning, and also others troubled either with the Palsie, or convulsive Paroxysms, or with a most grievous Colick, to be wholly freed in a short space by the help of Medicines. I have again known some scorbuticks swelled with the Dropsie through their whole Body, others reduced by an Atrophy to an extreme leanness, at last restored to perfect health. Therefore although those labouring with this Disease, are sometimes urged with affections highly dangerous, yet if the *Viscera* be still indifferently whole or at least not much vitiated, we ought not to despair of those evils; excited through the mere taint of the Scurvy. But on the contrary, when symptoms less terrible appear, if the Contents of the *Hypochondria* and *Abdomen* become hard and as it were schirrous, or if the Lungs begin to be corrupted; there is no great matter or benefit to be promised as to the cure of the Disease: But in cases not desperate, where a hope of recovering health is left, or at least the fear of sudden death is far off, if perchance the question be asked how soon or how long, how easily or difficultly the Cure may succeed, let the answer depend on these sorts of judgments.

1. The Scurvy as it does not strait kill those affected with it, or precipitate them into an incurable state, so neither is it soon or easily cured: For the chief cause of the Disease consisting in the dyscrasie of the Blood, is not easier to be taken away, than Wines to be restored to their due complexion when they are made fretted or ropy: Wherefore those corrupted with this taint, endure its hurt for many months, and sometimes years, yea sometimes through their whole life.

2. This Sickness depending on the sulphureous-saline intemperateness of the Blood, or like to the mere hot fretted Wine, is more hardly cured; than if the same proceeded from the saline-sulphureous dyscrasie, or less adust like to ropy wine: For this evil constitution of the Blood or Wine, may be after a sort brought again to the condition from whence it fell, but that is wont not easily to be reduced into the state which it departed from.

3. The Scurvy coming upon long Fevers and other Chronical Diseases, is cured, or coming upon an originally, or for some other occasions, sickly constitution, is esteemed of a more difficult cure, because indeed in these cases both the *Crasis* of the Blood is more vitiated, and not seldom also some hurt is affixed to the *Viscera*. Next to these they are hardly cured, who by reason of an evil manner of living, and chiefly by the assiduous drinking of the more generous Liquors, have contracted this taint with hurting the tone of the Ventricle and other *Viscera*: But those who are become scorbuticks by reason of Contagion, the unhealthfulness of the Air, going to Sea, or a sedentary Life, are more often and with less trouble restored to health.

4. This Disease being yet fresh, so long as the taint being included only in the bloody Mass, is not yet impressed on the Brain and nervous stock, nor hath excited durable symptoms in the solid parts, often admits of a perfect Cure: But if the affection being more deeply rooted, is propagated into the animal Kingdom, and there produces spasmodick and dolorifick passions, and that its poyson hath spread it self more largely by the eruption of spots and breakings forth, and by the erosion or eating away of the Gums and Teeth, and by other pathognomick signs, it is

ſcarce ever wholly extirpated; but the chief buſineſs of Medicine is employed in giving help to the Symptoms moſt grievouſly urging, and in ſuppreſſing their encreaſe and extremities.

5. Thoſe who labour with an inveterate Scurvy, refuſe to live moderately, but indulge their ſickly appetite, readily deſiring what is nought: And beſides they are very moroſe and difficult to take Remedies, ſo that they very often delude the labour of the Phyſician, that in truth it is better to leave them to their evil *genius*, than to defame profitable Medicines preſcribed in this caſe altogether in vain.

6. Becauſe this affection growing grievous, the morbifick matter is manifold and of divers ſorts, ſo that the cauſe of the Symptoms of a various kind and nature, is engendred; therefore Remedies not only of one kind are adminiſtred, but when a certain method of Medicine, though preſcribed with the beſt judgment, profits little or nothing in the Cure, the ſick are not preſently to be left off, but other medicaments and then others are to be tryed: For indeed the ſame things are not convenient to all, nor always to the ſame perſon. In the ſick Body the powers and combinations of Salts and Sulphurs every where vary, ſo alſo Medicines not helping ſhould be as often changed, till ſomething congruous and helpful be light upon.

7. If that notwithſtanding or by the uſe of Remedies not rightly adminiſtred, the Scurvy by degrees growing grievous, is carried daily into a worſe condition, at length it induces a Dropſie or Conſumption, the next paſſage then is to Death, either from this or that Diſeaſe: For after that the Blood is very much depraved, it pours forth its recrements, being more plentifully heaped up either on the Lungs, or in the *Viſcera* of the lower Belly; and ſo cauſes an affection of this or that kind equally mortal.

CHAP. VII.

Of the Cure of the Scurvy.

AS to what reſpects the Cure of the Scurvy, for that it is not one ſimple preternatural affection, but a whole Legion that is to be put to flight; therefore the method of Curing ought to comprehend manifold indications, and thoſe variouſly complicated and ſubordinate, which after the ordinary mode may be referred to theſe three heads: to wit, that they be preſervatory which reſpect and take away the cauſe of the Diſeaſe, and curatory which reſpect and take away the Diſeaſe it ſelf and its ſymptoms, and laſtly vital, which may defend or reſtore the power and ſtrength of the Patient.

The Indication three-fold.

1 *Preſervative.* At the very beginning of the Cure we ought to aim at the cauſe of the Diſeaſe, for this like the Root being cut off or pulled away, preſently the Trunk, Branches, and Fruit wither: Therefore as we have ſhown the cauſe of the Scurvy to be founded in the dyſcraſie of the Blood, *viz.* being either ſulphureouſly-ſalt or ſaltiſhly-ſulphureous; the firſt work muſt be that it may be mended and made better, both of this or of that ſort or nature. To this end in the firſt place impediments are to be taken away, then the primary intention it ſelf is to be performed; for either ſcope or purpoſe Remedies are required, from Diet, Chirurgery, and Medicine: As to Diet, there ſhall be ſhewn hereafter a ſpecial method of living, in the mean time we will proceed to the reſt.

The Reduction of the Blood to its due *Craſis* by appropriate Remedies, is chiefly hindred by theſe two ways, *viz.* In the firſt place, becauſe a proviſion of vitious nutritious Juice is continually inferred by it: Then Secondly, becauſe the Recrements brought into its boſom are not ſufficiently ſent away through convenient ſinks: Therefore care muſt be taken that the buſineſs of the Chyle may be rightly performed in the firſt paſſages, both that the vaporous Recrements may be ſufficiently purg-

ed

ed forth by Sweat, the ſerous by the Reins and Lymphæducts, the bilous by the galliſh *Cyſtis*, the melancholy by the Spleen, and all the others of every kind by their proper emunctories; then theſe offices being rightly inſtituted we muſt endeavour to reduce by ſpecifick Medicines, and chiefly thoſe endued with a volatile Salt, the dyſcraſie of the Blood: Remedies reſpecting every one of theſe intentions, ought to be uſed and adminiſtred together, but by what means and by what manner of adminiſtrations, ſhall be yet more particularly deſigned.

The Therapeutick Intentions.

1. That the Chyle may be perfectly concocted in the firſt paſſages, care muſt be taken that the load of excrementitious matter heaped up in them may be exterminated, that the ferment being loſt or depraved may be reſtored, that the paſſages and pores any ways ſtuft and obſtructed may be opened: To theſe ends, Cathartick, Digeſtive, and opening Medicines are deſtinated.

2. The Excrements gathered together in the bloody Maſs, when they are not ſufficiently ſent away by their proper emunctories, may be drawn forth by other convenient ways: For this purpoſe alſo Catharticks or Purgers, and beſides Diaphoreticks and Diureticks, or Medicines that evacuate by Sweat and Urine, are convenient.

3. The ſcorbutick dyſcraſie of the Blood ſhould be mended by Phlebotomy and ſpecifick Remedies: Wherefore that the whole buſineſs of the preſervatory indication may be reduced to one point, the Remedies which perform its chief intentions are Catharticks, Blood-letting, Digeſtives, opening Medicines, Diaphoreticks, Diureticks, and Anti-ſcorbuticks or Specificks. Then, for that indeed Digeſtive and opening Medicines are imbued, either of them with acid, biting, or ſaline Particles, they more often overcome; beſides, for that Medicines of this ſort move conveniently enough by Sweat or by Urine, therefore the Curatory proviſion requiſite to the aforeſaid intentions, may be yet reduced to ſtraiter limits; to wit, that it may almoſt only conſiſt in Cathartick, Digeſtive, and Anti-ſcorbutick Medicines, to which Phlebotomy may be added as occaſion ſerves: It now is my part to deſign ſome forms and preſcripts of them, and alſo the manner of uſing them.

Purging.

Purging.

1. The method preſcribed for the Curing almoſt of all ſcorbutical perſons, begins with Purging Medicines; for unleſs the firſt paſſages are made clean, Medicines deſigned for any other uſe are infected by their filths: Wherefore Vomiting ſometimes is no leſs convenient than Purging.

By Vomit.

If the Ventricle (as it is often wont to be) is grieved with a viſcid, ſouring, and unſavory matter, and endeavours to caſt out the impure Load, by a nauſeating and ſtriving to vomit, and if the Patient is wont to bear ſuch an evacuation ſtrongly enough and with eaſe, there is no hindrance, ſo that their ſtrength be not too much decayed, but that an emetick Medicine may be adminiſtred: For the more ſtrong, let them take an infuſion of *Crocus Metallorum* or *Mercurius Vitæ*, or the *tartarous Emetick* of *Mynſichtus*, or *Glauber*'s *Sulphur* of *Antimony*: Thoſe who are of a more thin and weak Conſtitution, let them take *Wine* of *Squills*, or the *Gilla* of *Theophraſtus*: Let thoſe who take but a ſmall doſe, drink after it good ſtore of Poſſet drink, till the Ventricle being full to nauſeouſneſs, Vomiting may be the more eaſily provoked, by ones Finger or a Feather thruſt down the Throat, which may be reiterated as often as they pleaſe. By this way of Vomiting the mere Contents of the Stomach being wiped from its foldings are ſent forth; neither are there ſtirred up in any other of the *Viſcera* about it, or in the Membranes (as it is wont to happen from Stybiates or Antimonial Emeticks) painful haulings or Convulſive, with ſwooning or fainting away. To thoſe whoſe Ventricle, by reaſon of evil digeſtion, eaſily gathers together a load of Phlegm or other degenerous matter, I have preſcribed (and often with good ſucceſs) ſuch a Vomiting once a Month, which they have found ſafe and wholeſome.

By Stool.

Where there is no need of Vomiting begin by a Purge, at leaſt let there be ſome days between this and the other evacuation if this follows. I judge what in times paſt has been inculcated by Authors, concerning the preparation of the humours, to be either needleſs, or the circulation of the Blood not underſtood, to be alto-

gether erroneous: But in the place of that intention are ſubſtituted things reſtoring the Ferment of the *Viſcera*, and things altering the *Craſis* of the Blood: In the mean time, that the filth of the firſt Paſſages and the recrementitious ſuperfluities both of the Blood and alſo of the nervous Liquor may be ſent forth; in the firſt place a light and gentle Purge is ordered and afterwards once a week it may be either oftner or ſeldomer repeated according to the ſtrength of the Patient, and the ſtrength of the Medicine may be proportionated according to the ſucceſs of the firſt Doſe. To this end Pills, Potions, Apozems, Electuaries, Pouders, and many other forms of Medicines are wont to be preſcribed.

Remedies made known in a more hot Scurvy.

If the Conſtitution of the ſick be more hot, and that the Scurvy ſeems to be founded in an aduſt Dyſcraſie of the Blood, *viz.* a Sulphureous-Saline, all Aloetick, and Diagrydiat Purges are to be ſhunned, and only the more temperate made out of Senna, Rhubarb, and others which do not too much agitate the Blood and Humors, are to be adminiſtred.

Pills.

Take of the leaves of Senna ℥j, of Rhubarb ℥vj, of Epithymum ℥iij, Roots of Polypodium of the Oak, of Engliſh or Monks Rhubarb dryed, of each ℥ß, of yellow Sanders ℥ij, of Celtick Spike ℥ß, of the Salt of Wormwood ℥ij, being cut and bruiſed, let them be digeſted in a Glaſs, in hot Sand, with white Wine and Fumitory Water, of each a Pint (or a Quart of our Magiſterial antiſcorbutick Water) for two days, the Colature being clear, let it be evaporated in the gentle heat of a Bath, to the conſiſtence of Hony, then add to it of the Pouder of the leaves of Senna, and of Rhubarb, of each ℥j, of the Cream of Tartar ℥iß, make a Maſs for Pills. The Doſe from ℥ß to ℥j.

Syrup.

Or prepare the ſame infuſion, which being evaporated by a gentle heat, to the conſiſtency of a Syrup, by adding at the end, of clenſed Manna and white Sugar, of each ℥ij, make a Syrup. The Doſe from j to ij ſpoonfuls in a convenient Vehicle.

Tincture.

Or of the Tincture of the ſame may be given ℥iiij or vj for a Doſe, by adding of the Cream of Tartar ℥ß, and if there be need of Sweating, of the Syrup of Pippins ℥iij.

Of Raiſins.

Or put to the præſcribed Tincture of Corinthian Grapes cleanſed ℥vj, let them be digeſted hot till the Grapes Swell, which being taken forth, evaporate the Liquor to the Conſiſtencie of a Syrup, adding to it of Sugar and cleanſed manna, of each ℥iß, then the Grapes being laſtly put into it, let the Medicine be kept in a glaſs Veſſel, cloſe ſtopped. The Doſe from one ſpoonful to two.

Electuary.

Or add to the aforeſaid Tincture, being evaporated to the half part, of freſh Caſſia, and of the Pulp of Tamarinds, extracted with antiſcorbutick Water, of each ℥iij, of the Conſerves of Violets, of Damask Roſes each ℥ij, of the Pouder of Senna, of the greater Compoſition ℥j, of the Pouder of Rhubarb ℥ß, of Cream of Tartar, of the Species of Diatrion Santalon, each ℥ij, let them be bruſed together in a Stone Morter, till they are reduced to the form of an Electuary. The Doſe about the bigneſs of a Walnut more or leſs, according to the ſucceſs of the Operation.

Pouder.

For thoſe whoſe Stomachs being full of loathing and will not admit of the Medicines, but in a ſmall quantity and elegant form: Take of the Reſine of Scammony *gr.* iiij to viij, of the Cream of Tartar ℈ß, of Celtick Spike *gr.* vj, mingle them and make a Pouder, let it be given in a ſpoonful of Gruel, or in the form of Pills.

Purges in a more cold Scurvy.

Thoſe who labour with the ſcorbutick Indiſpoſition, and are of a more frigid and cold conſtitution, and where the Diſeaſe ſeems to be founded in a Nitro-Sulphureous diſpoſition of the Blood, like to ropy Wine, are to have adminiſtred to them more ſharp Catharticks endued with more hot Particles.

Pills.

Take of Stomach Pills with the Gumms ℥ij of the Reſine of Jalap *gr.* 20, Vitriolat Tartar *gr.* 16, Oyl of Juniper ℈ß, with as much as will ſuffice of Ammoniacum, ſoluted in the Water of Earth-worms, make Pills 16, take 4 at a time once in 7 days.

Take of Pilulæ Tartar of *Bontius* ℥iß, of the reſine of Jalap *gr.* 12, of the ſalt of Tartar ℈ß, with what will ſuffice of Auguſtan Syrup, make Pills. 12.

Extract and Syrup.

Take of the Extract of Pil. Ruffi ℥j, of the Extract of black Hellebore ℈j, of the Salt of Tartar ℥ß, with what will ſuffice of Ammoniack ſolute, make 9 Pills to be taken, 3 for a doſe.

Take

Take of the Leaves of Senna ʒj, of Rhubarb ʒvj, of Mechoachan, Turbith: with Gums, of each ʒſs, of the Strings of Hellebore black ʒiij, of the Salt of Tartar ʒij, of yellow Sanders ʒiſs, of Winteran Bark ʒij, being ſliced and bruſed let them be digeſted in a Quart of Whitewine for two days, let it be ſtrained without preſſing it, and take of it by it ſelf, from ʒv to ʒvi, either in the extract or reduced to a Syrup, or electuary as the Tincture above deſcribed, but adding of as much as will ſuffice of the Pouder of Arthritice, or of Diaſena.

Or, there is prepared a Tincture of this ſort, which may be given to ſtrong men, from half a Spoonful to a Spoonful. Take of Salt of Tartar ʒj, of the ſmaller Spirits of Wine ℔iſs, let them digeſt till it becomes Yellow: to this being poured off from its Fæces, put of the Leaves of black Hellebore macerated in Vinegar ʒj, of yellow Sanders ʒj, the yellow part of Orange ʒiſs, let them digeſt being cloſe ſhut up and warm for 3 days. The matter being Strained clear, let it be diſtilled in Balneo to the half part, the remaining Liquor keep for Uſe. *Tincture.*

Take of ſharp-pointed Docks, of Polypodium of the Oak, ſtinking Nettles, and of Chervil, of each ʒvj, of the Leaves of Eupatorium and Betony, each j handful, of White Sanders and of Yellow, each ʒjſs, wild or baſtard Safforn ʒj, of the Tartar of White-Wine ʒſs, boyl them in three Pints of Spring Water, or ℔ijſs, till half is conſumed, add to it of Rheniſh-Wine ℔j, and preſently let it be ſtrained, to which put of the beſt Senna ʒſs, the Yellow Rind of the Orange ʒij Rhubarb ʒvj, of the Leaves of Black Hellebore ʒſs, infuſe them being warm and cloſe ſhut for 12 Hours, being ſtrained, let it be kept in a Glaſs cloſe ſtopped. The Doſe is ʒv to vj. *Apozem.*

We might here add many other forms of Purges, but there is no great need of variety in theſe: of the aforeſaid, either theſe or thoſe which ſhall be thought moſt convenient, let them be adminiſtred, and every 5 or 6 days as occaſion ſhall require iterated. Too often and violent purging, deſtroys the ſtrength and very much waſts the force of the *Viſcera*, and in the mean time takes not away the Diſeaſe.

After a Purge or two, if there be any need of taking away Blood, let it be done either by Phlebotomy in the Arms, or by Leeches in the Veins of the Fundament. It is not much matter whith Vein is Cut: nor is there ſo much benefit in the opening the Salvatella, as hath been commonly thought. The great do among Authors, who were ignorant of the Circulation of the Blood, about opening the Cephalick, or the Liver Vein, or any other chiefly in the Scurvy comes to nothing. Phlebotomie is indicated by the plentifulneſs and Vitiouſneſs of the Blood, which rather ought to be performed by taking away a ſmall quantity often, than a great deal all at once: For when the bloody Liquor becomes very impure, it is not more certainly mended by any kind of Remedies, than by letting it forth often and ſparingly. For as often as the old corrupted Blood is let forth, freſh, better and more pure ſucceeds. In the mean time there is need of Caution, leſt too great quantity be taken away at once, for its ſtock being diminiſhed together, Sanguification grows weak, and for that reaſon a Dropſy, or a Cachexia, or evil diſpoſition of the whole Body follows. *Phlebotomy.*

After Purging, and (if need be) Phlebotomy, many other kinds of Remedies, no leſs neceſſary, are required in the Scurvie: In the præſcribing of which in order, we ought preſently to conſider whether the Indications being only Præſervatory they may have place here, or ought not to be deferred to thoſe which are contrary, to wit, thoſe which reſpect the more grievous Symptoms: But if you endeavour the whole buſineſs of the Cure againſt the cauſe of this Diſeaſe, proceed according to the following method: It ſhall be ſhown hereafter what ſort of Cure is to be adminiſtred, (if perchance occaſion requires) to the Symptoms.

Therefore if the buſineſs of Medicine be chiefly deſigned againſt the cauſe of the Scurvy, and that it may be firſt eradicated by it ſelf for this end, as we ſhewed but now, there are moreover to be made uſe of at all times except on the days of purgation, Digeſtive and Specifick, or antiſcorbutick Remedies: to which ſometimes if need be, may be added Diaphoreticks, or Diureticks, or Medicines operating by Sweat or Urine. The forms of Medicines, for the performing theſe kind of Intentions, and manifold Præſcriptions, and of various kinds, are every where extant among Authors. It pleaſes me however, to place here ſome of the more

more ſelect, which I think good to diſtinguiſh into two Claſſes, according to the twofold nature of the Scurvy, to wit, the ſulphureous Saline, and Saline Sulphureous. And in the firſt place we will deliver what is convenient in the latter Diſtemper, to wit, where there is need of Medicines, indued with a certain Incitation, and very much filled with a volatile Salt.

Digeſtives. Digeſtive Remedies, which reſtore the Ferment of the Ventricle, and help its Function, and alſo of the other *Viſcera* ſerving to the Chyle; and Antiſcorbutick or Specifick, which take away the Dyſcraſie of the Blood, are either joyned in the ſame Compoſition, or at leaſt they are to be taken ſucceſſively the ſame day.

Among the Digeſtive Medicines, are deſervedly ranked, Creme of Tartar, Cryſtal Salt, and Tincture of Cryſtal, Vitriolate and Chalybeate Tartar, Elixir *Proprietatis*, ſimple Mixture: The uſe of every one of theſe given twice a day, does oftentimes prove beneficial.

Beſides you may eaſily make with the two following *Menſtruums* magiſterial Tinctures and Elixirs of divers kinds and digeſtives, appropriate to the Scurvy.

Take of the Spirit of Vitriol rectified ℥vj, of the Spirit of Wine Alcholiſated ℥xvj, mix them and diſtil them in a Glaſs Retort, with three Cohobations: Keep it for uſe in a Glaſs very well ſtopped. The Elixir *Proprietatis*, is better and more eaſily prepared with this compounded *Menſtruum*, than the ordinary way.

Take of Winteran Bark, of *Lignum* Aloes, of the Roots of the leſſer Galangal, each ℥ij, of Cinamon, Cloves, Cubebs each ℥j, *Ameos* or Biſhops Weed and Naſturtium Seeds, each ℥ß, being bruiſed, pour on them the aforeſaid *Menſtruum* till it be 3 Fingers breadth above them, let them digeſt in a Veſſel, in a Sand Furnace for 6 days. Strain it and keep in a Glaſs cloſe ſtopped. The doſe 20 drops, more or leſs in a ſpoonful of Canary Wine or proper Water. Let it be given twice a day.

Take of the whiteſt Amber, of Gumm, Hedera, Caranna, Tacamahaca, each ℥j, of Saffron ℥ß, of Cloves, Nutmeggs, each ℈ij, bruiſe them and pour on them the aforeſaid *Menſtruum*, and as before draw forth a Tincture. The doſe 20 drops as before.

Take of the Salt of blew Tartar ℥iiij, let them digeſt with ℔j of the Spirit of Alcholiſate Wine to the Extraction of the Tincture. This is the other *Menſtruum*, whereby you may prepare Elixirs out of Gumms, Spices, *&c.* after the ſame manner as with the former *Menſtruum*.

Specifick or Antiſcorbuticks. Whilſt theſe ſorts of Remedies are adminiſtred in a ſmall doſe morning and evening, or firſt and laſt at Medicinal Hours, to wit, before eight in the morning, and four in the after-noon: other kind of antiſcorbutick Medicines are to be taken, which for the moſt part we are wont to præſcribe in a double form, to wit, ſolid and liquid to be taken together, ſo that the ſolid being firſt taken the other may be drunk after it: Of either there are very many Species and ways of Compoſition extant: *viz.* in the ſolid form, Electuaries, Confections, Pouders, Pills, Tablets or Lozenges: In the liquid are Decoctions, Infuſions, Expreſſions, diſtilled Waters, and medicated Wines and Ale. Of every one of theſe kinds we will propoſe ſome more ſelect Medicines.

Electuaries.

Take of the Conſerves of the Leaves of Scurvy-graſs, of Roman Wormwood, of Fumitory, of each ℥ij, of the Pouder of Winteran Bark, of the Roots of Angelica, Aron, each ℥ij, of the Species of Diatrion Santalon ℥jß, of the Pouder of Crabs Eyes ℥j, of the Salt of Wormwood ℥ij, with what will ſuffice of the Syrup of Citron Peels, make an Electuary.

Take of the Leaves of Scurvy-graſs, Conſerve of Brook-lime, made with an equal part of Sugar, of each ℥iij, of the Troches of Capers and of Rhubarb, each ℥ij, of the Salt of Wormwood and of Scurvy-graſs, of each ℥j, of the Pouder of Ivory and Coral calcined, of each ℥j, make it up into an Electuary with as much of the Syrup of the Juice of Scurvy-graſs as will ſuffice.

I was wont to præſcribe Conſerves of the exterior Bark of Limons and Oranges, alſo of the Purple Flowers of the Aſh-tre, of the Leaves and Flowers of Cardamine, of the Roots of Sharp pointed Docks, and Engliſh Rhubarb prepared with an

an equal part of Sugar, which of themſelves or mixed with other Conſerves and *ſpecies* of the ſame kind are made into an Electuary.

Take of the Conſerves of the yellow part of Oranges and Limons, of the flowers of the Aſh Tree, of each ʒij, of the powder of the Roots of *Contrayerva* ʒj, of the leſſer Galangal ʒß, of the Roots of Aron ʒij, of the *Species Aromatic. roſat.* ʒj, of the ſalt of Wormwood ʒij, with as much of the Syrup of Candied Nutmegs, as will ſuffice to make it up into an Electuary. The doſe of theſe kind of Medicines is the quantity of a Nutmeg, drinking after it ſome proper Liquor.

For Country people and the poorer ſort, for whom leſs dear and more eaſily to be prepared Medicines are required, I preſcribe after this manner. Take of the leaves of Scurvygraſs and Brooklime, of each ʒiiij, of the whiteſt Sugar ʒviij, let them be well beaten in a Mortar together, adding of Winteran Bark powder ʒß, of Tartar calcined with Nitre ʒiij, with as much Spaniſh Wine as will ſuffice, let it be made up into an Electuary. The doſe about the quantity of a Walnut twice in a day, drinking an appropriate Liquor after it.

Take of the leaves of Scurvygraſs ℔j, of Raiſins of the Sun ſtoned, of white Sugar, each ℔ß, the boylings of wild Radiſhes ʒij: Let them be beaten together in a Mortar, and reduced to the form of an Electuary. The doſe is about the quantity of a Walnut twice or thrice in a day.

Confections.

Take of Aron compound ʒj, of the pouder of Winteran Bark ʒß, of the *Species* of *Diatrion Santalon*, of the Troches of Capers, each ʒij, of the ſalt of Wormwood and of Scurvygraſs, each ʒjß, of the rinds of Candied Oranges ʒiij: Let them be bruiſed in a Mortar together, then add of white Sugar diſſolved, in as much as will ſuffice of the water of Earth Worms ʒiij, and ſo make it up into a Confection.

Take of the Roots of *Eryngo* and *Scorzonere* candied, of each ʒij, of Walnuts and *Myrobalans* candied, each *N°.* ij, of electuary of *Saſſaphras* ʒvj, of the pouder of Cubebs and Cardamums each ʒij, of the pouder of the Roots of Zedoary, and of Angelica, each ʒjß, of the ſalt of Wormwood ʒij, with as much Syrup of candied Walnuts as will ſuffice: Make a Confection.

Take of the pouder of *China* Roots, of Saſſaphras wood, each ʒß, of yellow and white Saunders each ʒij, of the ſeeds of Rocket, Cubebs, *Naſturtium*, grains of Paradiſe, of each ʒiß, of the *Species Dialacca*, Cinnamon, Orris, the leſſer Galangal, each ʒj, of the ſalt of Wormwood ʒij, of the Conſerves of the yellow of Oranges, and of Sugar *anthoſat.* ʒiij, diſſolved in as much water of Snails as will ſuffice, and as before make a Confection: The doſe as much as a Nutmeg twice a day, drinking after it ſome appropriate Liquor.

In ſome caſes of the Scurvy, where there is need of the uſe of Steel, or of Steel prepared with Sulphur, add of it ʒiij, or of Vitriol of Steel ʒij, to any of the preſcriptions of the Confections or Electuaries, and after the taking of the Medicine once or twice a day, exerciſe the Body according to its ſtrength. *Chalybeat Medicines.*

Pouders.

Take of the pouder of Aron compounded ʒjß, of Winteran Bark ʒß, of Cubebs, the grains of Paradiſe and of Cardamums, each ʒij, of the ſalt of Wormwood ʒiij, of the Orange Tablets ʒiij, make a Pouder: The doſe ʒj in a proper Liquor.

To the aforeſaid Pouder add of the Nuts of the Indian Fruit *Cacao* ℔ß, let it be brought into a Maſs or Paſte in a warm Mortar, the doſe ʒij: Let it be taken after the ſame manner as Chocolate, *viz.* boyled in Spring water with either Roſemary flowers or Betony, or with the Roots of *Scorzonere*, or alſo with the ſhavings of Ivory or Hartshorn.

Pills.

For thoſe who had rather have the Medicine in a leſſer doſe, and form of Pills; take of the Roots of Virginian Snakeweed, *Contrayerva*, each ʒij, of Winteran bark, ſeeds of Rocket and of Cubebs, each ʒiij, of the ſalt of Wormwood and of Scurvygraſs each ʒjſs, of the extract or the rob of Juniper ʒſs, and with a ſufficient quantity of the Syrup of preſerved Nutmegs, make a Maſs: Doſe 4 Pills a day, drinking after them ſome proper Liquor.

Tabiets or Lozenges.

For the more delicate Tablets or Troches are preſcribed after this manner: Take of the pouder of Winteran Bark, of the eyes of Crabs, each ʒiſs, of the pouder of Pearls ʒſs, of the fineſt Sugar ℥vj, diſſolved in as much water of Earthworms as will ſuffice, and boyled up to the height of Tablets: Add of the Spirits of Scurvygraſs ʒij, of which make Lozenges or Tablets, each weighing ʒſs, take about ʒj twice a day, drinking an appropriate Liquor after it.

The Orange Tablets ſold in the Apothecaries Shops in Oxford.

TAke of the Rinds of Oranges, Limons, and Citrons preſerved, of each ℥j, of preſerved *Eringo* Root ℥ſs, of Pine Nuts and Piſtaches each 20, of ſweet Almonds blanched number 10, of the pouder of Anniſeeds ℥ſs, candied Ginger ℥ij, *Species* of *Aromatic. Roſat.* and of Nutmeg each ʒj, of the Roots of Galanga ʒj, ten Cloves, of Amber grieſe *gr.* iiij, of Musk and Civet of each ij grains, of the whiteſt Sugar ℔iiſs diſſolved in Roſe water, and boyled up to a Tablet: Of which make Troches or Lozenges as before.

Liquid Medicines.

So much for Medicines in a ſolid form or more thick ſubſtance, that are wont to be given to ſcorbutical perſons: That the virtue of which might be the better and with the greater benefit, carried into the maſs of Blood, for the moſt part liquids are preſcribed to be drunk after them: Although great variety of them and divers ways of compounding them are extant, yet the chiefeſt and moſt uſual are thoſe we mentioned above, aud ſhall now ſubjoyn the forms of each of them.

1. *Decoctions.*

Although Decoctions are the moſt familiar kind of liquid Medicines, yet more rarely made uſe of in the Scurvy, becauſe the ſimples which are chiefly beneficial to this Diſeaſe, as Scurvygraſs, Brooklime, *&c.* loſe their virtues received from the volatile Salt by boyling; yet becauſe Remedies by this means are eaſily and ſuddenly prepared, they ought to be admitted ſometimes, for that it has been found by experience, that they have ſome efficacy. For Country and poor People, an eaſie Medicine by this preparation is commended by many Authors. Take of the leaves of *Naſturtium Aquaticum* or water Creſſes iij handfuls, of the leſſer Sorrel *m* ij, being bruiſed let them be macerated or ſteeped in ſix pints of Milk, and then boyled till the third part be conſumed: Take of it from 6 to 8 ounces twice a day. A Decoction of Wormwood is praiſed hy *Eugalenus* and others, the following Remedy I have often tryed with good ſucceſs. Take of the tops of Broom *m* iij, cut ſmall and boyled in 3 pints of ſtrong Ale till half be conſumed; let it be taken from ij to iij ounces twice in a day.

2. *Infusions.*

An Infusion being added to the Decoction, makes a most profitable Medicine. Take of the Roots of *Scorzonere*, of Chervil, each ʒj, of the leaves of *Eupatorium* and *Chamepitys*, each *m* ß, of burnt Hartshorn ʒij, of Raisins *m* ß, boyl them in in 3 pints of Spring water till the third part be consumed, add then of Rhenish Wine half a pint, and presently strain it into a glass vessel, to which put of the leaves of Scurvygrass and Brooklime each half a handful, of the rinds of Oranges steeped and cut small ʒß, make an Infusion warm and close stopped for six hours, strain it and let it be kept in a close Vessel: The dose ʒvj twice in a day after a solid Medicine.

Take of Whey made with Whitewine or Cider ℔ß, boyl in this of the Roots of Burr docks and *Eringoes* steeped, of each ʒvj, of preserved Juniper Berries ʒß, the liquor being boyled away to the third part, let it be strained into a Jugg, to which let there be put of the leaves of Scurvygrass and of Brooklime each *m* j, make an infusion warm and close stopped for 6 hours: The dose half a pint twice in a day, after a solid Medicine.

Sometimes Infusions made by themselves are of notable use. Take of the leaves of Scurvygrass *m* j, the slices of Horse-radish Roots *m* ß, Winteran Bark bruised ʒij, let them be put in a glass Vessel with Whitewine or Cider, and Scurvygrass water, each ℔j, let an Infusion be made in a Cellar for 2 or 3 days: The dose ʒvj to viij twice in a day as before.

3. *Juices and Expressions.*

'Tis also a very commendable use to take twice or thrice a day, of the Juice of antiscorbutick herbs or fruits or their expressions, by themselves or with their appropriate Liquors, for so it is presumed, the virtue of the Remedy is exhibited whole and undiminished.

Take of the leaves of Scurvygrass, of water Cresses and of Brooklime each *m* iij, being bruised let the Juice be wrung out hard, and kept in a close Vessel: The dose ʒiß to ʒiij twice in a day, in a draught of Ale, Wine, or distilled Water.

Take of the leaves of Scurvygrass *m* iiij, of Wood-sorrel *m* ij, being bruised let the Juice be pressed forth, which being put into a Glass close stopped will quickly grow clear; for the sharpness of the Wood-sorrel precipitates the thicker parts of the Scurvygrass: The same also happens if the Juice of Oranges is mingled with the Juice of Scurvygrass, the dose ʒij or ʒiij twice in a day.

Take of the leaves of Scurvygrass *m* iiij, of Brooklime and of water Cresses each *m* ij, of long pepper ʒiij, of the shavings of Horse-radish ʒij, all being bruised together let them be put into a glazed Vessel, with Rhenish or Spanish Wine which is best liked ℔ij, the mouth being very close shut, let it stand in a cold Cellar for two days, then let it be pressed forth strongly: The dose is ʒiij twice in a day, after a solid Medicine.

Take of the leaves of Scurvygrass *m* iij, of Brooklime and water Cresses and of Wood-sorrel, of each *m* j, being bruised pour on them of the water of Snails and of Earthworms each ʒvj, make an Expression strongly, which keep in a Glass close stopped: The dose ʒij twice a day.

4. *Syrups.*

For the same reason as Decoctions so also Syrups are but little used in the Scurvy; for as much as the virtue of the simples chiefly efficacious, evaporates in the boyling; yet because there is need sometimes for sweetning of appropriate Liquors with such a Medicine for some; we will propose here our preparation, the strength of the ingredients being preserved as much as may be.

Therefore take of the leaves of Garden Scurvygrass *m* vj, of the rinds of 4 Oranges and two Limons cut very thin, of the slices of Horse-radish *m* ß, of long pepper poudered ʒiij, all being bruised together let the Juice be pressed forth, which being

preſently put into a cloſe ſtopped Glaſs, place in a cold Cellar till it ſettles and grows clear, then the Liquor being clear pour it off ſoftly into another glaſs, and being faſt ſhut let it be kept warm in *Balneo Mariæ:* In the mean time for every ounce, take of Sugar ʒiſs, and let all the quantity be diſſolved in as much of the water of Earthworms, and boyled up to a thickneſs, to which let the aforeſaid Liquor be poured by degrees, warm and ſtirred together with a *Spatula:* As ſoon as it is incorporated let it be taken from the fire, and being cold let it be put into a glaſs, and in this hang tyed up in a little Rag; of Cinnamon bruiſed ʒiſs, of the ſeeds of water Creſſes, and of Rocket poudered and mingled together, of each ʒj.

5. *Diſtilled Waters.*

Diſtilled Waters becauſe they are a neat and pleaſant Remedy, fill almoſt every Page among the anti-ſcorbutick preſcripts: Some diſpenſations of theſe eſteemed very profitable and fit, are in our *Pharmacopœa*; as the compound water of Radiſhes, and the magiſterial of Earthworms and of Snails. Beſides, there are extant very famous preſcriptions of theſe ſorts of Waters, delivered by *Quercetan*, *Dorncrellius*, *Sennertus*, *Doringius*, and other Authors. Moreover every Phyſician is ready to preſcribe as occaſion ſerves, ſuch like appropriate to the condition of every ſick Body; for the anti-ſcorbutick Ingredients and others added, which may reſpect particular Diſtempers being received, and being cut, ſliced, and bruiſed, are put into ſome convenient Liquor, to wit, Whitewine, Cyder, or the Whey of Milk made by either of them; then let the whole mixture be diſtilled in a Cucurbit or in a Roſe Still: We will here ſubjoyn one or two forms uſed by us.

Take of the leaves of both the Scurvygraſſes, of Brooklime, of water Creſſes, and the tops of Broom of each *m* iiij, of the leaves of Germander and *Chamepitys* or ground Pine each *m* ij, of the Roots of Horſe-radiſh ℔ß, of Aron, Angelica, *Imperatoria* or Maſter-wort each ʒiiij, the outer peels of 4 Oranges and of as many Limons, of the Roots of *Calamus aromaticus* ʒj, of Cinnamon, Cloves, each ʒß, being bruiſed and cut pour to them of the beſt Cyder ℔viij, let them digeſt for two days in a glazed pot cloſe ſhut, then let them be diſtilled in a common Still, the firſt and laſt water being drawn off let them be mixed together.

In Winter time when green herbs are not to be had, we preſcribe after this manner: Take of the leaves of Scurvygraſs *m* iiij, the tops of Broom, Pinetree, and Juniper, of each *m* iij, the middle bark of the Elder Tree and of the Aſh Tree each ʒiii, of the Roots of Horſe-radiſh and of *polypody* of the Oak, each ʒiij, the rinds of 4 Oranges and of as many Limons, of Winteran Bark ʒiiii, being cut and bruiſed put them into 8 pints of Whitewine or Cyder, or the Whey made of either of them, and let them be diſtilled.

The ſimple water of the leaves of Aron being diſtilled in the Spring time, is an efficacious Remedy againſt the Scurvy, if it be taken to the quantity of 3 or 4 ounces twice a day with ſome other Medicine.

The ſimple water of Scurvygraſs being poured upon freſh leaves bruiſed and diſtilled, and ſo often reiterated with new cohobations, becomes an effectual Remedy: Moreover, the ſtrong Spirit of Scurvygraſs is prepared after this manner. Take of the leaves of Scurvygraſs as much as will ſuffice, being bruiſed let them be made up into Balls ſuch as thoſe of Woad which the Dyers uſe, then pour upon thoſe Balls being put into a well glazed Pot, either as much of the water of Scurvygraſs or of Wine of the ſame herb, as will cover them at leaſt 4 fingers, and let them be kept exactly ſhut for 3 or 4 days in ſome cool place, then let the whole matter, being put into an Alembeck be diſtilled: Let the diſtilled water, being put into a Cucurbit, be rectified, at firſt there goes forth the ſtrong Spirit, of which may be taken in a fit Vehicle from 15 to 20 drops.

6. *Anti-ſcorbutick Wine and Ale.*

I was wont to prepare ſimple anti-ſcorbutick Wine of excellent uſe, after this manner in the Spring or Summer time. Take of the leaves of Scurvygraſs gathered in a clear day as much as you pleaſe, being bruiſed and the Juice preſſed forth, fill a Veſſel

Veſſel of 3 or 4 Gallons with it, and putting thereto 1 or 2 ſpoonfuls of Yeaſt, let it ſtand to ferment for two days; then the Veſſel being cloſe ſhut let it be put into a Wine Cellar for 6 months, then the Liquor being clear and of colour like Spaniſh Wine, draw it forth into Bottles and keep it for uſe: It may be kept good and incorrupt for many years, the doſe ʒiij or iiij twice in a day.

Medicated Wines, of which may be taken 4, 3, or 2 ounces at medical hours daily, as alſo at Meals, are prepared after this manner: Take of Scurvygraſs leaves *m* iiij, ſhavings of wild Radiſhes ʒiiij, of Winteran Bark ʒß, of the outer rind of 4 Oranges and of as many Limons, and let them be put into a glaſs with 12 pints of Whitewine, Rheniſh, or thinner Spaniſh Wine: The Veſſel being cloſe ſhut up let it be kept in a cold place, and as often as you need, draw the Wine off clear.

It is a uſual thing to preſcribe for ſcorbutical perſons, medicated Ale or Beer to be drunk conſtantly for their ordinary drink: Let Ale or Beer be prepared as much as will fill a 4 Gallon Veſſel, and inſtead of Hops boyl therein of the tops of the Pine or the Firr-tree *m* iij, and after it hath fermented in the Veſſel, let there be put to it of the leaves of Scurvygraſs *m* iij, of the roots of ſharp pointed Docks prepared ʒiiij, the rinds of 4 Oranges, and after it hath ſtood 7 days drink of it.

Theſe ſort of medicated Ales may be prepared with other ingredients, according to the affection or temperament of the Patient, by which kind of Remedy the medicinal Particles altering the dyſcraſie of the Blood, being continually carried into its Maſs together with the Aliments, many have found much benefit in taking away the cauſe of the Scurvy. But for as much as we have ſhewn the cauſe of this, even as the *ſpecies* of the Diſeaſe to be two fold, and that hitherto the Medicines propoſed, reſpect only the ſaline-ſulphureous intemperature of the Blood: In the next place it behoves us to add ſcorbutick Medicines, which are convenienr in the other, *viz.* in the ſulphureous-ſaline dyſcraſie of the Blood.

CHAP. VIII.

Of Medicines of every one of the aforeſaid Forms reſpecting the Scurvy, being excited in a more hot Conſtitution, and ſulphureous-ſaline Dyſcraſie of the Blood.

IN ſome ſcorbutical perſons, the uſing much of the aforeſaid ſharp things, as Scurvygraſs, Horſe-radiſh, Winteran Bark, and others endued very much with a volatile ſalt, hath been found hurtful: Wherefore in ſuch like caſes where the morbifick cauſe conſiſts in a more hot dyſcraſie of the Blood, like to ropy wine, temperate Medicines leſs agitating the particles of the humors, apt to grow hot of themſelves are preſcribed: Wherefore we will here add the forms in the ſame order as the former, and firſt we will begin with the ſolid Remedies.

Electuaries.

Take of Conſerves of Brooklime, Cardamines, made with an equal part of Sugar, of each ʒiij, of the *ſpecies* of *Diatrion ſantalon*, and of *Diorrodon Abbatis* each ʒj, of the pouder of Ivory ʒj, of Pearls ʒß, of the ſalt of Wormwood and of Tamarisk each ʒj, and as much as will ſuffice of the Syrup of Coral, make an Electuary.

Take of the Conſerves of wood Sorrel, and of Cynorrhodon or of Hyps each ʒiij, (or of the Conſerves of ſharp pointed Docks, and of the roots of Succory each ʒiij) of the troches of Rhubarb ʒij, of the *ſpecies* of *Diamargarit. frigid.* ʒiß, of Tamarisk Bark ʒj, of *Sal Prunellæ* ʒiß, preſerv'd *myrobalans* 2, and with what will ſuffice of the Syrup of preſerv'd *Myrobalans*, make an Electuary.

For the Poor I was wont to preſcribe this more ready Medicine. Take of the Leaves of Brook-lime ℥vj, of wood Sorrel ℥ij, of white Sugar ℥viij, let them be bruiſed and beaten together, by adding to it of the Flower of ſweet Fenil Seeds ℥ß, of the Pouder of Ivory ʒij, of *Sal Prunellæ* ʒjß, with what will ſuffice of the Syrup of the Juice of Brooklime, make an Electuary.

Confections.

Take of the Pouder of China Root, and of the Male Pæony, each ʒj, of white and yellow Sanders, each ʒiij, of Ivory ʒjß, of Pearls ʒß. of Crabs Eyes ʒj, of Coral being ſteeped in the Juice of Orenges, and ground on a Marble ʒij, of the whiteſt Tartar ʒjß, of white Sugar ℥vj, diſſolved in as much water of *Scordium* compound as will ſuffice. Make a Confection.

Take of the candied Eryngo Roots, and of Scorzonere, each ℥ij, of the Pouder of Aron Compound ℥ß, of the Species of *Diatrion Santal.* ʒij, of *Sal Prunellæ* ʒj, with what will ſuffice of the Syrup of Cloves. Make a Confection.

Pouders.

Take of the Pouder of the Leaves of *Chamepitys*, and of Aron Compounded, each ℥jß, of Ivory Pouder, of red Coral prepared with the Juice of Orenges, each ʒij, of the Orange Tablets ℥ij, mingle them and make a Pouder, doſe 1 Spoonful twice in a day.

Pills.

Take of the Species of *Diatrion Santal.* of *Diamargarit. Frigid.* each ʒij, of the Seeds of Citron and of *Carduus* bruiſed, each ʒjß, of the Roots of Cretian Ditany, and of the male Pæony, each ʒjß, of the Salt of Tamarisk ʒij, with what will ſuffice, of the Gelly of Harts Horn or Snakes Skins, make a Maſs.

Tablets.

Take of *Species Diatrion Santalon*, of *Diamargarit. Frigid.* of each ʒjß, of Perls poudered, of red Coral prepared, of Pouder of Ivory, each ʒj, of Sugar ℥vj, diſſolved in Water of *Scordium*, and boyled up to a Conſiſtence, make Tablets as before.

If that with theſe ſort of temperate Antiſcorbuticks, there ſhall be any need of the uſe of Steel, let there be added to the Electuary or the Confection, or alſo to the Maſs of Pills, of the Magiſterium of Steel of *Myrſythus*, or of the extract of Steel of our preparation ʒij: In ſome caſes of *Crocus Martis* about ʒijß or ʒiij may be added to the like Compoſition: But it ſeems better to give the Chalybeates in the Liquors to be drunk after the ſolid Medicines, than to put them into the aforeſaid Compoſitions. It remains now that we preſcribe the forms of the Liquors.

Decoctions.

In the Scurvy excited after a long continued Fever, theſe ſort of Decoctions are given with benefit, which may purify the Blood and plentifully move Urine.

Take of the Roots of Chervil, Scorzonera, Sorrel, Parſely, of each ℥j, of the Leaves of Agrimony, and Harts Tongue, each *m*j, of Harts Horn burnt ʒij, of the Rinds of 3 Apples, of Corinthian Grapes ℥ij, of Liquoris ʒiij, let them be boyled in 4 Pints of Spring Water till the third part be conſumed, add to it of *Sal Prunellæ* ʒij, or ʒiij. The doſe ℥vj, twice or thrice a day.

Take of preſerved Eringo Roots ℥vj, of Graſs Roots ʒij, of the Leaves of Gooſe-

graſs

graſs or Cleavers, *m*ij, of Agrimony and of Liver-wort, each *m*j, of Raiſins of the Sun ℥ij, of white Sanders ℥j, of Liquoriſh ℥ij, let them be boyled in 4 Pints of Spring Water, to the Conſumption of the third part. The doſe ℥vj, after a ſolid Medicine.

For Country, and the poorer ſort of People, that they might not fall itno the Scurvy after a Fever, I was wont to præſcribe that they ſhould take twice a day this following draught, *viz.* Take of the Roots and Leaves of Dandelyon *m*jſs, let them be boyled in a Pint and half of Poſſet Drink till the third part be conſumed: let it be ſtrained and ſerve for two doſes.

Or Take of the Roots of Dandilyon *m*ſs, of Citron, and *Carduus* Seeds, each ℥j, let them be boyled in a Pint and a half of Poſſet Drink made of Apples or Cyder, till the third part be conſumed.

Infuſions.

The Apozems but now preſcribed become more powerful againſt the Scurvy, if being prepared without Liquoris, they be ſtrained into a Jugg, into which let there be put of the Leaves of Brook-lime and of water Creſſes or Cardamines, each *m*j, then make an Infuſion warm, and cloſe ſhut for 6 Hours. The Liquor at laſt being ſtrained, let it be kept in cloſe Veſſels. The doſe ℥vj twice or thrice in a day. Alſo make an Infuſion of Whey boyled with the Roots of Dandelyon, or the Leaves of Fumitory ſtrained into a Veſſel with one handful of the Leaves of Brook-lime, and as much of Celandine the leſſer.

Chalybeate Infuſions are wont to be of frequent Uſe, to wit, of the Salt of Steel, or of the Magiſtery or Extract put into ſome Decoction or diſtilled Water; but as the natural Water or Spaws, ſo alſo the Artificial, of our preparation of Steel diſſolved in Spring Water, and impregnated with the Infuſion of Antiſcorbuticks, hath been drunk with very notable Benefit.

Juices and Expreſſions.

Take of the Leaves of Brook-lime, of water Creſſes, each *m*iiij, of wood Sorrel *m*ij, being bruiſed let the Juice be wrung forth, and let it purify in a Glaſs cloſe ſhut, which it will ſoon do. The doſe is ℥jſs, to 7 Ounces in a convenient Vehicle.

Take of the Leaves of Brooklime *m*iiij, of the Branches or ſtrings of Engliſh Rhubarb *m*ij, being bruiſed let the Juice be preſſed forth.

Take of the Leaves of Brooklime, of Creſſes, of Cardamines, of the leſſer Celandine, of wood Sorrel, each *m*ij, being bruiſed let the Juice be preſſed forth, add to it a fourth part of the Juice of Oranges: Let it be kept in a Glaſs.

Syrups.

As often as there is any need of Syrup for any other Compoſition, we make uſe of either the Compound Syrup of the Juice of wood Sorrel, or of Fumitory, or of Coral; or alſo a Magiſtral of the Juice of Brooklime may be prepared after the ſame manner, as we before preſcribed concerning the Juice of Scurvy-graſs.

Diſtilled Waters.

Diſtilled Waters more temperate are prepared, either by changing the ingredients, or the *Meſtruum*, or both.

As to the firſt, proceed after this manner. Take of the Leaves of Brooklime, Garden Creſſes, Fumitory, Harts Tongue, Liverwort, Baum, the tops of Tamarisk and Cyprus, of each ℥ſs, of the Roots of ſharp pointed Docks, of the Polypody of the Oak, each ℥ij, of the outward Bark of four Oranges, of cleanſed

Snails

Snails ℔ij, being cut and bruiſed pour on them of Whey made of Syder ℔vj, let them be diſtilled in a common Diſtillatory.

2. As the *Menſtruum* is more weak, let the Ingredients be moderately hot.

Take of the Leaves of Scurvygraſs, of Brooklime, of Water and Garden Creſſes, each *m*iij, the Rinds of 4 Orenges, a pint of Snails, being all cut ſmall, pour to them of the common Whey of Milk, or freſh Milk ℔vj. Let them be diſtilled in the ordinary way.

3. In the Scorbutick Atrophie and Tabid Diſpoſition, where no hot thing agitating the Blood, Spirits and Humours ought to be admitted; both the Ingredients and the *Menſtruum* ought to be temperate, and ſweetning the Blood.

Take of the Leaves of Brooklime, of Cardamines, Harts Tongue, Maiden Hair, Liverwort, Betony, Agrimony, of each *m*ij, of Snails cleanſed ℔jß, (or the ſoft fleſh of a Capon, or the Heart of a Sheep cut to pieces) being all ſcalded and cut, let them be bruiſed together, and then pour to them ſix Pints of freſh Milk (or Fumitory Water) and let it be diſtilled after the ordinary way.

Medicated Wines and Ale.

Although the uſe of Wines ſeems to be leſs agreeable in the Scurvy, excited by reaſon of heat, or the Sulphureous-Saline Dyſcraſie of the Blood, yet when either the Stomach is more weak, or that by long cuſtom, they at leaſt require drink of Wine mixed with a little Water; the ſame ſort of Liquor ought to be prepared, both more temperate and alſo medicated. And firſt of all may be granted them ſmall Wines diluted with Water, and impregnated with the Infuſion of Baum, Borage, or of Pimpinell or Burnet, or others.

Moreover Wines are prepared of the Juice of Currans, Raſps, Cherries, and of other garden Fruit, which being ripened by fermentation become very grateful to the Stomach, and purify the Blood; Then Cyder, the familiar and almoſt genuine Wine of our Country, ſo it be clear, ſweet, ſoft, and without any ſharpneſs, helps very much in the Scurvy. Beſides to this Liquor, being freed from its Fæces, and put up into little Veſſels, may be put ingredients of various natures or kinds; *viz.* of which ſort are the tops of Pine or Fir-tree, the Flowers of Tamarisk, alſo the ſhavings of Harts-Horn, or Ivory, which will ſweeten the Liquor and preſerve it from groowing ſour; for as much as the Particles of the fluid Salt abounding in tht Cyder, being apt to cauſe it to grow ſour of it ſelf, are hindered by diſſolving the foreſaid Ingredients.

The more temperate medicated Ale or Beer, is preſcribed after this manner. *viz.* let there be Ale prepared to fill a ſmall Veſſel, holding 5 or 6 Gallons, in which inſtead of Hops, let there be boyled the tops of Pine or Firr Tree, or of Tamarisk, or the ſhavings of any of their Woods, then after it hath worked, put into the Veſſel the Roots of ſharp-poynted Docks dryed, (than which certainly there is not a more helpful remedy in the Scurvy) to theſe ſometimes may be added the Leaves of Brooklime, Watercreſſes, Barberries, and alſo Orenges and Limons ſliced may be put into the Veſſel.

The Leaves of Harts Tongue, put into the Veſſel of ſmall Ale, after fermentation, gives it a moſt grateful taſt and ſmell.

CHAP. IX.

Of the Curatory Indication of the Scurvy, by which help is afforded to the Diſeaſe it ſelf, and to the Symptoms chiefly afflicting.

WE have hitherto treated concerning the Cure of the Scurvy, and ſhewed what belongs to the preſervatory indication, to wit, the taking away of the morbifick cauſe, *viz.* both the intentions of healing and manifeſt Remedies. Which kind of method being timely entred upon and rightly inſtituted, oftentimes performs the whole buſineſs, for that the cauſe of the ſickneſs or the Root being cut off, the diſtempers depending upon it wither away of their own accord. But yet we may not always follow this courſe directly, but ſometimes ſtepping of one ſide, go another way to work, becauſe ſometimes more grievous accidents and ſymptoms happen, which require peculiar and as it were extraordinary help of Medicine, which ought to be attended upon immediately, and the general Cure often interrupted: As to this it is to be obſerved, that when the diſtempers which follow upon the Scurvy, require proper Remedies according to the nature of every one of them, and the diſpoſition of the Patient, yet there ought always to be mixed with theſe Anti-ſcorbuticks. There will be no need to inſtitute a curatory method, againſt all the diſeaſes and diſtempers with which the Scurvy is wont to environ one, for ſo I might tranſcribe the whole practice of Medicine, but we ſhall have regard only to the ſymptoms chiefly afflicting, by which either the life of the Patient is endangered, or the principal Cure is hindred: By what means and with what Medicines ſuch may be cured, we ſhall now ſhew.

Of the Curing difficult Reſpiration and Aſthmatical Paroxyſms.

Difficult breathing with ſtraitneſs of the Breaſt and aſthmatical fits, ought to be taken away by appropriate Remedies, and to be preſcribed beſides the general method, otherwiſe the ſick may be ſoon brought into danger of life. As theſe kinds of evils ariſe for the moſt part in ſcorbutical perſons, by the vice of the Blood ſtagnating in the heart, or by reaſon of the pneumonick Nerves, being hindred in their function, ſo they are to be cured with Cardiacks or anti-ſpaſmodick Medicines, *viz.* of Hartshorn, Soot, Blood, of mens Skulls, alſo the tincture of *Caſtor*, Antimony, or of Sulphur, the flowers of *Sal Armoniac*, the flowers of Benjamin, alſo *Elixir Proprietatis*, in theſe caſes are of excellent uſe: Which kind of Remedies may be given at every turn, with a doſe of ſome anti-ſcorbutick Liquor, proper alſo againſt the aforeſaid diſtemper. For the ſudden allaying of difficult breathing, merely ſpaſmodical when it afflicts very ſore, I never found a more ready Remedy than 10 or 12 drops of our tincture of opiate *Laudanum*, being given in ſome convenient Liquor, for that ſleep creeping on the Spirits remit their inordinations, and being in the interim refreſhed, they reſume afterwards their priſtine task after a due manner. The more ſharp Clyſters which very much cleanſe the Belly, alſo ſudorifick Decoctions and Diureticks often give help.

Take of the Roots of Bur Docks, of Butter Bur, Chervil, each ℥j, of the leaves of Maiden hair and *Germander* each *m* i, of bur Dock and baſtard Saffron ſeeds each ℥iii, of Raiſins ℥ii, being cut and bruiſed let them be boyled in Spring water ℔iij, to the conſumption of the third part, add of Whitewine ℥iiij, let it be ſtrained into a Jug, to which put of the leaves of Scurvygraſs cut *m* j, of the roots of candied *Enula Campane*, and cut ſmall ℥ß, let them infuſe hot and cloſe ſhut for three hours: The doſe ℥vj twice or thrice a day.

of

Of the Diſtempers of the Ventricle, that are wont to follow upon the Scurvy.

Sometimes ſcorbutical People are wont to be cruelly tormented with great pain and fulneſs of the Ventricle, alſo with a nauſeouſneſs and belchings, and ſometimes alſo with cruel and frequent vomiting. Which kind of vices ariſe ſometimes from the Chyle, being there degenerated into a putrefying humour, but more often from the morbifick matter being carried away, either by the paſſage of the Blood or the nervous Juice, and depoſited either in the cavity of the Stomach, or fixed in the nervous folds and membranes. In theſe caſes if a viſcid or ropy ſtinking matter, or otherways hurtful be caſt out by vomiting, and that it be ſuſpected that the cauſe remains within the cavity of the Ventricle, a gentle Vomit of wine of Squills, or of vitriol Salt, will be convenient to be taken: Or if the peccant humour diſturbs the Belly, either an extract of Rhubarb or an infuſion of it, the Salt or Cream of Tartar being added. But if the matter ſticks cloſely within the Membranes or nervous foldings, Diaphoreticks, or things reſtraining the effervencies of the Salts rather help: *Elixir Proprietatis*, or the flowers of *Sal Armoniac*, or the Spirits of Soot may be taken by turns, with the water of Radiſhes compound, or of Snails, or any other anti-ſcorbutick Liquor. In the mean time, once or twice in a day there may be applied to the region of the Stomach, a fomentation of Wormwood, Centaury, Camomil Flowers, the Roots of Gentian and others, boyled in Whitewine, with woollen Stuphs dipt in it and wrung out very hot. The uſe of Clyſters is convenient, and not ſeldom Opiates yield great help.

Of the Pain of the Belly and Scorbutick Colick.

There is almoſt no Diſtemper requires the ſpeedy help of Medicine more than the Colick and torments of the Belly, which frequently happen in the Scurvy. Againſt theſe evils, Clyſters of ſeveral ſorts, Fomentations, Liniments, and Cataplaſms are adminiſtred. Here the uſe of Opiates are thought to be very neceſſary, certainly in this caſe that preſcript of *Riverius*, that purging Pills ſhould be adminiſtred with ſome *Laudanum* mixed with them, may take place; for by ſleep being moved, and a plentiful ſolution of the Belly being cauſed, very often the fits are taken away: But the pouders of Shell-fiſh, by which the acetoſous Salts are imbibed or fixed, conduce very much to the profligating or driving away the morbifick cauſe. As for example, take of the pouder of Crabs eyes, and of Egg ſhells each ʒiſs, of Pearls ʒi, make a pouder, let it be divided into 12 doſes, let one of which be taken every ſixth hour, with ſcorbutick water or with the decoction of the Seeds and Roots of Burdocks, as is above deſcribed, or elſe with poſſet drink, in which is boyled the Roots and ſeeds of Burdocks, the leaves of ſweet Marjoram, and Saxifrage, and the leaves of Scurvygraſs infuſed. In the ſcorbutick Colick, alſo in the diſtempers of the Ventricle, but now deſcribed the uſe of *Epſom* and *Barnet* purging waters or the like, affords oftentimes very great benefit.

Of the Lask and Dyſenterical Diſtempers.

An inveterate *Diarrhœa* ſuch as often happens to ſcorbutical perſons, ought in no wiſe to be ſtopped with aſtringent Medicines, nor is it eaſily cured by alteratives or every Anti-ſcorbutick: Purging waters impregnated with iron or vitriol are the beſt Medicines for this diſtemper: Next to theſe are the artificial ſpaws or chalybeate medicines, which are wont to give notable help. *Crocus Martis* rightly prepared is to be preferred to all others., I have uſed the following method with good ſucceſs: Firſt a Purge of the pouder or the infuſion of Rhubarb is to be inſtituted, with aſtringent Spices added, and often to be repeated every three or four days. In the other days, let a doſe of the following Electuary of the bigneſs of a Nutmeg be taken in the morning, and at 4 a Clock after noon. Take of the Conſerves of common Wormwood made with an equal part of Sugar ʒvj, (in a more hot conſtitution, inſtead of this let Conſerves of red Roſes be taken) *ſpecies Diarrhodon Abbatis* ʒij,

℥ij, of the pouder of white and red Sanders each ℥i, of *Crocus Martis* the beſt ℥ß, with what will ſuffice of the Syrup of Steel, make an Electuary.

In dyſenterical diſtempers or a *Tenaſmus* or deſire of going to Stool, you muſt proceed after the like method; if it may be had, let the uſe of purging waters be inſtituted, beſides let often Clyſters prepared of vulnerary decoctions be uſed. Lately I cured one greatly labouring with a tedious dyſentery, who had for a long while voided by Stool many ounces of Blood, by this Medicine. Take of the beſt Rhubarb in pouder ℥i, of the pouder of red Sanders ℥ii, of Cinnamon ℥i, of *Crocus Martis* ℥iij, of *Lucatella*'s Balſom what will ſuffice to make a pilulary Maſs, he took 4 Pills ſometimes every day and ſometimes every other day for a Week, and was perfectly cured. I alſo preſcribed him to drink medicated Ale conſtantly, with the roots of ſharp pointed Docks, and the leaves of Brooklime infuſed in it.

Of the Vertigo *and fainting of the Spirits and other Diſtempers, that are wont to be joyned to the ſame ſcorbutical Affection.*

The *Vertigo* often comes upon an inveterate Scurvy, to which is wont to be added a fainting or frequent ſinking of the Spirits, and almoſt a continual fear or dread of it, alſo a *ſtupor* or ſtiffneſs in the members, and a ſenſe of tingling or pricking here and there running about them, which kind of diſtempers proceed from the failure of the animal Spirits in the fountain it ſelf, and ſometimes of thoſe within the Nerves, both the Cardiack and thoſe ſerving for the motion of the Members; and when they depend on the Brain and nervous ſtock, being beſet very much with the ſcorbutick Salt, they are not eaſily cured. Cephalick Remedies, ſuch as are convenient in the *Vertigo* and paralytick Diſeaſes excited by themſelves, are to be adminiſtred with anti-ſcorbuticks mixed therewith: Therefore firſt of all a proviſion of the whole being made by fit Catharticks, and ſuch as are convenient in the Scurvy, you may proceed with appropriate Remedies againſt the ſaid Diſeaſe after this manner.

About the beginning of the Cure, let there Blood be taken from the veins of the Fundament by Leeches, and unleſs any thing may contradict, let it be at ſeveral times repeated.

Take of the pouder of the male Peony root ℥ß, of red Coral prepared ℥ij, of an humane Skull and of Elks Claws each ℥i.

Take of the beſt Sugar diſſolved in the compound Peony water, or in the water of wild Radiſh, and boyled up to a conſiſtence ℥viii, of the beſt oyl of Amber rectified ℥ß, make thereof Tablets, and take of them from ℥iß to ℥ii morning and evening, drinking after it a draught of the following diſtilled Water.

Take of the leaves of Scurvygraſs, of Brooklime, of Creſſes of the Garden, of the Lillies of the Valley, of Sage, Roſemary, and Betony, each *m* iii, of green Walnuts ℔vi, of the rinds of 6 Oranges and of 4 Limons, of the freſh roots of the male Peony ℔ß, being bruiſed and cut, let there be put to them of the phlegm of Vitriol ℔j, of Whey made with Cyder ℔v, let them be diſtilled after the ordinary way, and let the whole water be mixed together: The doſe ℥iij to ℥iiij.

Of Hæmorrhagies or Fluxes of Blood.

Great fluxes of Blood very often threaten great danger in the ſcorbutick diſtemper, in ſo much as the ſick are given over, for that reaſon to ſudden death, whilſt the Blood breaks forth now from the Noſe, now by the menſtrual Flux or at the hæmorrhoidal veins, even to the fainting away of the Spirits or ſwooning: Beſides that ſometimes being caſt out from the Lungs or Ventricle, gives a ſuſpition of an Ulcer lying hid, or at leaſt a great debility in the affected part: Wherefore if theſe bloody excretions are immoderate, or happen in an inconvenient place, they ought for the preſent to be ſtopped, and prevented for the time to come.

For the ſtaying of the Blood when it breaks forth immoderately, the method is commonly known, and there is nothing more to be done or particular in this diſtemper by reaſon of the Scurvy, than when excited upon other occaſions: But as to the preventing Hæmorrhagies, Remedies, which take away the acrimony of the

Blood, and bind up the mouths of the Veſſels being too looſe and gaping, are to be adminiſtred, either intention is beſt performed by Chalybeate Medicines. The uſe of vitriolick Spaws is very fit in this buſineſs, beſides the infuſions of Steel, Extracts, Salt, and ſuch kind of preparations which chiefly contain the ſaline or vitriolick nature of the Iron, are always moſt profitable againſt Hæmorrhagies: by what means Iron and its preparations, produce theſe effects and ſeveral others in the humane body, we have ſhown already.

Take of the Conſerves of red Roſes, of Cynorrhodon or of Hipps each ℥iij, of the *ſpecies Diarrhodon Abbatis*, and *Diatrion Santalon* each ʒjſs, of the ſalt of Steel ʒj, of the beſt *Crocus martis* prepared ʒij, of red Coral prepared ʒiſs, with what will ſuffice of the Syrup of Steel, make an Electuary: Let the quantity of a Nutmeg be taken thrice a day, drinking after it a draught of ſome proper Liquor.

For poor people I am wont to preſcribe after this manner, Take of the tops of Cypreſs, of ſtinging Nettles each ℥iiij, of Brooklime ℥ij, let them be pounded in a Mortar with ℥x of white Sugar, then add the thin ſhalings of Iron finely poudered ℥i, of the pouder of white and red Sanders each ʒij, with what will ſuffice of the Syrup of Nettle juice, make an Electuary: The doſe the quantity of a Walnut twice a day.

Take of diſtilled water, or of a temperate anti-ſcorbutick Decoction ℔ij, of our Steel prepared ʒij, mingle it in a glaſs: The doſe from 3 to 4 Ounces.

Take of the tops of ſtinging Nettles, of Brooklime each *m* iiij, being bruiſed let the juice be preſſed forth and kept in a Glaſs, the doſe ℥ij or ℥ij twice a day, with diſtilled anti-ſcorbutick Water.

Of the Vices of the Mouth coming of the Scurvy.

As ſoon as the ſcorbutick Taint ſeiſes on the parts of the Mouth, ſo that the Gums begin to ſwell, and their fleſh to become ſpungy, preſently Remedies which may drive away putrefaction from them, are carefully to be adminiſtred: Among theſe, things to waſh the mouth and liniments are of chief uſe, whilſt the Diſeaſe is beginning about theſe parts, or growing grievous therein, which yet have reſpect to various intentions, and ſo are ſeverally to be prepared, *viz.* the fleſh of the Gums at firſt ſwelling up, are to be freed and dryed from the incurſions of the Corrupt and ſalt Blood or *Serum*: Afterwards their fleſh growing flaggy and falling from the Teeth, is to be defended from rottenneſs, and alſo that it may more ſtrictly embrace the Teeth, it is to be conſtrained or bound cloſer, for theſe and perhaps other intentions, Gargariſms or waters to waſh the mouth of ſeveral kinds are inſtituted: The chief Ingredients of which for the moſt part are boyled vegetables and infuſed Minerals. The Herbs or Roots which are boyled in ſome fit liquor, *viz.* Water or Wine are moſt commonly either ſharp, bitter, or ſtyptick or binding, and ſo theſe ſort of Decoctions are impregnated, either with a Volatile, Lixivial, Vitriolated, or Chalybeated, or aluminous Salt, we will here ſhew you ſome forms of every kind of them.

1. When therefore the fleſh of the Gums begins firſt to ſwell up, and to become ſpungy by reaſon of the influx of a corrupt and ſalt Blood and *Serum*; take the middle bark of the Elder Tree and of the Elm each *m* ſs, of the leaves of Savory, Sage, Hedg-muſtard, garden Creſſes, each *m* j, of the roots of Pellitory ʒij, being bruiſed and cut let them be boyled in ℔iiij of Lime water, to the conſumption of the third part: If a ſweetning be required, add of honey of Roſes ℥ii, make a Gargal. Or take of Camphorated Vitriol ℥i, (commonly called by our Countrymen by the name of Captain *Green*'s Pouder) a quart of Spring water, mingle them in a glaſs and ſhake them well together, and then the Liquor ſettling and growing clear, may be made uſe of. Or let there be prepared a Lye of the aſhes of Broom, or Roſemary, or of Nitre, or Tartar calcined, boyl in 3 pints of this, of the leaves of Savory, Thyme, Sage, Roſemary, each *m* j, when it is ſtrained put into it two handfuls of Scurvy-graſs leaves, make an infuſion cloſe and warm for three hours, then let it be ſtrained again, and kept to waſh the mouth often in a day.

For the ſame intention alſo, Liniments may between whiles, and eſpecially at night be applied, that their virtues may be communicated to thoſe that are ſick, or while they are ſleeping. There is a preſcript very celebrious among Authors, and

by

by long uſe confirmed. Take of the Leaves of Columbine, of curled Mint, Sage, Nutmeg, Mirrh (which ſometimes may be omitted) of each ʒij, of burnt Allum ʒß, of Virgin Hony ʒiiij, or what will ſuffice, make a Liniment according to Art.

2. When the Fleſh of the Gums growing flaggy, forſakes the Roots of the Teeth, ſometimes a light Scarification may be adminiſtred, beſides let the mouth be waſhed with this Decoction. Take of the tops of the Bryar, Cypreſs and Ladyſmock Leaves, each *m*j, let them be boyled in three Pints of Water, in which Iron hath been quenched, to the Conſumption of the third part, to the ſtraining add of Hony roſat. ʒij, mingle them.

This kind of Liniment may be applyed. Take of the Pouder of the *Florentine Oris*, of the Leaves of Sage and of St. *John's* Wort, each ʒij, of bole Armenic, of *Sal Prunellæ*, each ʒj, of freſh Virgins Hony, as much as will ſuffice, let them be well incorporated, by working them together.

2. When the Gums begin to putrefy and corrupt, and alſo the Teeth, and the fleſh about them grow looſe and yeild a noyſom Savour, more ſtrong Medicines and great reſiſters of Putrefaction are adminiſtred, here an infuſion of Vitriol Camphorated, alſo of the Medicinal Stone, have the chief place.

Or take of the Roots of Gentian, and of round Birthwort being cut, each ʒß, of the Leaves of the leſſer Centaury, pontick Wormwood, Savory, Columbine, each *m*j, let them be boyled in Lime water, or a Lie made of either Iron or Alum ℔iiij, to the conſumption of the third part. Add to the Colature of raw Hony ʒij or iij, mingle them.

4. If the falling out of the Teeth be chiefly feared, take of the Bark of the Roots of the Sloe Tree ʒj, of Tormentil and Biſtort whole, each *m*j, of the outer Rinds of Pomegranats, and the Flowers of the ſame, each ʒß, let them be boyled in three Pints of Spring Water. Add to it when ſtrained, of Alum 2 or iij drams, of the beſt Hony ʒij, mingle them. Take of Vitriol Champhorate, of burnt Harts-horn, each ʒj, of Nutmeggs ʒß, of the beſt Hony what will ſuffice, make a Liniment. Or take of the Pouder of the Root of Biſtort, of the Rinds of Pomegranats, of bole Armenick, of burnt Allum, each ʒj, of Hony of Roſes what will ſuffice, add of the Spirit of Vitriol ℈j; make a Liniment.

5. If at any time (as ſometimes it is wont) that deep and putrid Ulcers eat into the Gums or other parts of the Mouth, the aforeſaid more ſtrong Remedies are often to be uſed. Beſides, let little raggs be often applyed to the affected place, ſteeped in Egyptian Oyntment diſſolved in the Spirit of Wine, or in an Infuſion of Sublimate, or of the medicinal Stone. In theſe caſes the Cure is to be left to a ſkilful Chirurgion.

Of the Pains that are wont to Infeſt the Leggs, and ſometimes other Limbs, Chiefly in the Night.

Againſt theſe Pains, for that indeed they are ſometimes very bitter; beſides the general method of curing the Scurvy, Specifick Remedies, and things helping this Symptom are ordered. Therefore in ſuch a caſe, the means of Purgation being inſtituted, and Phlebotomy alſo (if there be need) celebrated, it is convenient to ſet upon the Diſeaſe with inward Phyſick, and outward Topicks.

As to the firſt, thoſe which move by Sweat and alſo by Urine, does often avail, for that they carry another way, the lixivial and ſour recrements of the Blood and nervous Juice, that are wont to be gathered together in the affected part: But cheifly thoſe things are to be adminiſterd, which may defend either Humour from its depraved nature, *viz.* both Saline and Sour: ſhelly Pouders, Crabs Eys, Jaws of Pikes, alſo Spirits, and Flowers of *Sal Armoniack*, Spirits of Blood, Tincture of Antimony and of Coral: Decoctions of the Roots and Seeds of Burdocks, *Chamepitys*, Germander, very much help. Which kind of Remedies are to be taken twice or thrice a day with Antiſcorbutick diſtilled Waters. Water diſtilled out of Horſedung, to which is added Scurvygraſs, Brooklime, Gout Ivy, and ſuch like, is ſometimes very profitable. In the mean time Liniments, Fomentations, Cataplaſms and ſuch kind of Applications which allay Pains, are outwardly to be applyed.

Of the wandring Scorbutick Gout.

Eugalenus, *Wierus*, the *Campen* Phyſitian, and *Gregorius Horſtius*, have wrot particularly of this diſtemper, ſaid to be very frequent in the Northern Countries of *Belgia*. A certain Sign of which is manifeſted by putting a live Worm to the grieved place, for he is preſently wont to leap off, twine himſelf about, bend himſelf round, to ſlide along, and to dye: which I have alſo often experimented on our Country men. The reaſon of which Experiment (as it ſeems) is this: we have determined the cauſe of the Pain and Tumour ſtirred up in the affected part, to be for that the ſaline or Lixivial Fæculencies from the Blood, and the ſour, from the nervous Juice, being depoſited in the ſame place, do mutually ferment or grow hot, even as Spirits of Vitriol and Salt of Tartar, mingled by deliquium or melting: further from ſuch a ſtriving and agitation of diſſimilar particles, as the Pain and Tumour are cauſed, ſo indeed very ſharp, and as it were Corroſive *Efluvia's* plentifully evaporate, which kill the worm layd upon the grieved place, even as if he ſhould be held over thoſe Liquors boyling: Becauſe of the effect of this Experiment, the cure of this Diſeaſe has been ordained by Worms, to wit, Remedies prepared of them; but I know not whether being taken inwardly, they ſo certainly deſtroy the Diſeaſe, as they being applyed outwardly, are deſtroyed by the Diſeaſe. Even as Worms, ſo alſo Snails, Hoglice, or Sows, and other bloodleſs little animals, for that they abound in a volatile Salt, do often enough become an efficacious remedy.

Henry Petræus relates two remedies uſed againſt this Diſeaſe, in *Weſtphalia*. Take 9 Worms bruiſed together, with two ſpoonfuls of Wine in a Morter, and wrung out hard through a woollen Cloth, to theſe add half a meaſure of Wine, and let it be taken 3 ſpoonfuls morning, noon and night, for ſeveral days. 2. Take two or three ſpriggs of Savin, two ſpoonfuls of Virgins Hony, let them be boyled in a meaſure of Wine, till two fingers breadth be waſted: let it be ſtrained, and take of it 4 or 5 ſpoonfuls thrice in a day. A certain Vulgar Potion, a kin to the former Medicine, is cited by *Horſtius*, and called the Monaſterie Potion: Take of Sage Betony, Rue, of each 5 Leaves, of earth Worms, every one with red rings about their Necks, number 5, a little Savin, of Devils bit Roots 2, let them be bruſed with Water of Elder Flowers, and the Juice being preſſed forth, let it be given to move Sweat. Alſo the like preſcript is propoſed by the *Campen* Phyſitian in *Foreſtus*.

Certainly in this diſtemper the Magiſterial Water of Earthworms, preſcribed in the London Diſpenſatory, is extreamly convenient. I have often given alſo with good ſucceſs, the Spirits and Salts of Harts horn, the Spirit of Blood, and the Flowers of *Sal Armoniack*. Beſides the ſhelly Pouders, as of Crabs Eyes, Corals, Perls, and Vegetables, which have in them Antidotes for the Gout, as the Roots of Birthwort, the Leaves of Groundpine, Germander, and the like joyned with Antiſcorbuticks, conduce to the cure of this Diſeaſe. Outwardly, for the allaying of the Pains, beſides Anodynes, things under the form of a Liniment, Fomentation, or Cataplaſm, are made uſe of: The Oyl of Earth-worms, Froggs, and Toads, are often very profitable. I was told by a very ſignal Perſon much obnoxious to this Diſeaſe, that the Water of the Contents, taken from the Ventricle of an Ox newly killed, and drawn off clear by diſtillation, and with Raggs dipt in it warm, and applyed for a Fomentation, brings certain help.

Of the Convulſive and Paralytick Diſtempers that are wont to come upon the Scurvy.

When at any time the ſcorbutick Taint breaking in upon the Brain and Nervous Stock, doth greatly infect the moiſtning Liquor of either Province, for that reaſon indeed, ſeveral Diſeaſes, and chiefly the paralytick and Spaſmodick, or cramplike diſtempers (as we have already ſhown) are wont to ariſe: even according as the morbifick matter, being carried to the Animal Kingdom, ſhall be either narcotick or exploſive. Although theſe kinds of Diſtempers ſhall be accounted in

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this caſe Symptomatical, yet they being very grievous, do challenge for themſelves both the name and the greater part of the Cure, before their parent the Scurvy; ſo that the Sick is ſaid rather to labour with the Palſy, or the Convulſion, then with the Scurvy, and alſo Medicines proper for thoſe diſtempers, are at the ſame time propoſed, with the others requiſite to other Intentions.

For the curing thoſe Diſtempers coming upon the Scurvy, that chiefly muſt be performed, that the Remedies appropiate to them be rightly or conveniently applyed with Antiſcorbuticks. As to the Convulſive Diſeaſes, what I have made known in a former tract, may be eaſily trasferred hither. But as to the Palſy, Lethargy, and many other diſtempers of the Brain, and nervous Stock we intend ſhortly to make publique ſome ſpecial Diſquiſitions thereupon: In the mean time it is not fit, that we ſhould in this place foreſtal the therapeutick Method, which belongs to thoſe diſcourſes, but rather we will propoſe what may ſeem neceſſary at the end of this Work, the Caſes and Cures of ſome ſcorbutick Perſons, lying ſick alſo of thoſe Diſeaſes.

Of the Atrophy or waſting of the Fleſh: alſo of the Scorbutick Fever, which oftentimes is either the Cauſe of it, or the accident, or effect of it.

There are three kinds of Cauſes, hanging by a certain Series, from one of which or more the ſcorbutick Atrophy without the Conſumption of the Lungs is wont to be produced, *viz.* either the Chyle is perverted by the default of the firſt paſſages, by which means it does not carry ſufficient or laudable proviſion to the Blood. Secondly, or being brought to it, yet by the fault of the Blood, it is not rightly changed into Blood and nutricious Juice. Or thirdly and laſtly, the nutricious Juice being prepared in the bloody Maſs, by reaſon of the fault of the nervous Liquor, is not rightly aſſimilated in the ſolid parts.

The Remedies appropriate to this Symptome reſpect either the emendation of the firſt paſſages, or of the aforeſaid Humors. As to the firſt, ſometimes it happens by reaſon of the Tone of the Stomach being broken, or its Ferment vitiated, ſo that it comes to paſs that the aliments put therein are not rightly dreſſed, but turn into an unprofitable Rottenneſs. To theſe ſort of evils, gentle Catharticks, digeſtives and ſtrengthners are to be adminiſterd. But more often the work of Chylification or of making the Chyle, is hindered by reaſon of a Schirrous Tumour, being excited now in the Ventricle, now in the Meſentery or in the circumjacent part. In this caſe opening and diſſolving things are convenient; and the uſe of Spaws or Purging Waters has bore away the Bell from all other remedies: Beſides Fomentations, Liniments, or Plaſters, ought to be outwardly applyed.

Further, it ſometimes happens that without any Tumor ſtirred up in the *Viſcera*, the milkie Veſſels being impacted by ſome thick and viſcous Matter, to be ſo much obſtructed, that the Proviſion of Chyle, though laudable enough and plentifully made, is not ſufficiently carried into the Blood. In this diſtemper, for the moſt part the Belly voides copiouſly white excrements like curdled Milk, and not like others dyed or ſtinking with Choler. The reaſon of which is, for that the impoveriſhed Blood more ſparingly begets the yellow bile, from which being poured into the Inteſtines, the colour and ſtink of the Excrements proceed. In this caſe the purging Spaws are convenient, and alſo with things opening, taken inwardly, Liniments, Fomentations, and Baths are uſed outwardly.

Againſt the *Maraſmus* or waſting of the Fleſh, ariſing from the fault of the Blood, degenerating from its Complexion, Aſſes or Cows Milk diluted with Water, or other proper Water diſtilled, often brings help. The broth of Snails or milk Meats, with them boyled in them; beſides diſtilled waters of Milk or Whey, with Snails and temperate antiſcorbutick Herbs mixed, help very much in this Caſe: alſo to this end, decoctions with Vulnerary and antiſcorbutick Herbs infuſed therein are taken with good ſucceſs: In the mean time Frictions to the external parts, with woollen coathes made warm and dipped in reſumptive Oyntment, or the freſh Oyl of Walnuts, may be dayly adminiſtred.

When the Atrophy ariſes from the Vice of the diſtempered Blood, perverting by

by that means the nutritious Juice, it hath moſt commonly joyned with it, an erratick Fever with nightly ſweats, for that the ſanguinious Maſs is compelled to inequal and uncertain effervencies by that degenerate Juice; and that the ſo troubleſome matter is caſt out by the nightly Sweat. In this caſe a ſlender Diet being ordered, let them often take Decoctions and diſtilled waters, which fuſe and puriſie the Blood, with anti-ſcorbuticks mixed therewith.

Take of the ſhavings of Ivory and of Hartshorn each ʒijß, of *Eringo* Roots preſerved ʒvj, of the Roots of Chervil, Dandelyon, each ʒß, of the leaves of Harts Tongue and Liverwort each *m* j, one Apple cut, of Raiſins of the Sun *m* j, let them be boyled in Spring water ℔iiij, to the conſumption of the third part: Being ſtrained, put into it of the leaves of Brooklime bruiſed *m* ij, of *Sal Prunellæ* ʒiß, or of fixed Nitre ʒj, make an infuſion warm and cloſe for 3 hours: Take of it iiij or ʒvj thrice in a day.

Take of the leaves of Brooklime ℔iiij, of Sorrel and Dandelyon whole each *m* ij, of Snails cleanſed ℔iß, the rinds of two Oranges: Being ſliced, cut, and beaten, pour to them of ſweet Milk or Whey made with Cyder, or of the Juice of freſh Apples ℔vj, let them be diſtilled after the ordinary way, take of it ʒiij twice or thrice in a day.

Of a Rheumatiſm.

This Diſtemper we have determined to proceed from the congreſſion and mutual effervencies of the Salts which are of a divers nature and generation, to wit, of the fixed coming from the Blood, and the acetous coming from the nervous Juice. The ſubjects of either Salts are the ſuperfluous feculencies depoſited, and by the aforeſaid humours acted into certain turgeſcencies or riſings up, being ſpread abroad into the parts, now into theſe now into thoſe: Wherefore that the Diſeaſe may be cured, and the turgeſcencies of the humors allayed, both their ſuperfluous feculencies are to be purged forth, and alſo both the degenerate Salts of either order, are to be reduced and made volatile.

For the two former intentions, a light Purge and Phlebotomy are chiefly required, and ought to be often repeated according to the ſtrength of the Patient; alſo Diureticks and Diaphoreticks which may convey forth ſome way the ſalt Seroſities, are next to be given: That theſe ſort of Evacuations may the better ſucceed leiſurely, with a good habit and nature aſſiſting, Opiates are often made uſe of: For the other ſcope on which the chief hinge of the cure doth turn, alteratives, and chiefly thoſe which are indued with a volatile Salt, do greatly help: Wherefore in this caſe it is a common, but not to be contemned Medicine, to drink twice or thrice a day 4 or 6 ounces of an Infuſion made of Stone-horſe dung, in ſmall Wine or Ale or in proper diſtilled water. But a Medicine a little more grateful, though not more efficacious may be prepared, if a water be diſtilled out of that Dung with anti ſcorbutick Ingredients, infuſed in Whitewine or Cyder; which may be taken twice in a day from ʒiij to ʒiiij, I have often preſcribed in this caſe Spirit of Hartshorn, and of Blood, with very ſignal benefit to the ſick.

Of the Dropſie.

As we have determined that the Dropſie that is wont to ſucceed upon the Scurvy, is two fold, *viz.* habitual and occaſional, we ſhould utterly loſe our labour to ſpeak of the cure of the former, for in truth no Remedies can be able to reſtore the Liver and the Lungs, and the other *Viſcera* ſometimes vitiated, and the complexion of the Blood wholly overthrown. In ſuch a caſe if any thing be thought fit to be done, the bounds of Medicine will be but narrow, for neither for Catharticks nor Diaphoreticks, nor for any other more ſtrong ſort of Evacuation, is there any place left: Therefore chiefly and indeed only Cordials and Diureticks muſt be inſiſted on. To theſe ends, *Elixirs*, Tinctures, Electuaries, Powders, Infuſions, Decoctions, diſtilled Waters, *&c.* which are partly againſt the Dropſie and partly againſt the Scurvy, are to be adminiſtred; but becauſe they ſignifie little we ſhall omit preſcribing their forms.

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The ſeorbutical Dropſie ſuddenly excited from an evident or certain occaſion, as hath been ſhown, very often admits of a Cure, which that it might more eaſily ſucceed, firſt of all the tumults of Nature are to be quieted, and its inordinations to be ſuppreſſed: Wherefore if awaking do very much infeſt, Sleep muſt be allured by the uſe of Opiates, and then it muſt be provoked as often as there is great need. As ſoon, as by reaſon of ſtrength, it may be lawful to purge, let the following Pouder be taken, and a due ſpace being between let it be repeated, and in the interim let the Belly be kept ſoluble by frequent Clyſters. Take of *Mercurius Dulcis* ℈j, of the reſine of Jalap *gr.* v to 10, of Cloves ℈ß, mingle it, and let it be given in a ſpoonful of Watergrewel; at other times Diureticks, and ſometimes Diaphoreticks are carefully to be taken. Take of the tincture of the ſalt of Tartar, impregnated with an infuſion of *Millepedes* or Hog lice as much as you will, let there be taken of it ℈j to ℈ij twice in a day, with an appropriate Liquor.

Take of the Spirit of *Sal Armoniac* what you will, the doſe ℈ß to 15 drops, after the ſame manner. Take of *Millepedes* prepared ʒiij, of the Salt of Tartar ʒij, of Nutmegs ʒj., mingle them and make a Pouder: The doſe ʒß twice in a day with a proper Liquor. Or take of Bees dryed and poudered ʒij, of the pouder of Ameos Seeds ʒi, of the oyl of Juniper ℈j, of Turpentine what will ſuffice, make a Maſs of Pills: The doſe ℈j to ʒß twice a day, drinking after it a ſpecifick Liquor.

Take of the leaves of either Scurvygraſs, of water Creſſes, Pepper wort, Arſe-ſmart, each *m* iij, of the Roots of Aron, Briony, of the Florentine Oris each ʒiiij, of the middle Bark of the Elder Tree *m* ij, of Winteran's Bark ʒij, the outward rinds of 4 Oranges and of 3 Limons, of new Juniper Berries ʒiiij, being cut and bruiſed, put to it of Rheniſh Wine 3 pints, of Wine of the Juice of Elder Berries ℔ij, let them be diſtilled after the ordinary way, and let all the water be mixed together. Doſe ʒiij to ʒiiij twice in a day, after a doſe of any of the Medicines preſcribed before.

Let there be prepared Decoctions and medicated Ale, ſuch as hath been before deſcribed, adding thereto anti-dropical Ingredients.

Of the Crackling of the Bones.

There yet remains a ſymptom ſometimes, though rarely coming upon the Scurvy, *viz.* a crackling of the Bones, the cure and reaſon of which being omitted in the former Pathology, it will not be amiſs to ſpeak of it here. I have known ſome, but not above three or four, who whilſt they laboured with the Scurvy were troubled with its evil, not only in the humours and fleſhy parts, but at laſt alſo in the Bones themſelves, for as often as they bended any of their Members any way, the heads of the Bones as if they were naked, rubbing againſt one another made a great noiſe: Further, as they lay in bed and turned themſelves from one ſide to the other, a great noiſe from the colliſion of the *Vertebræ*, as if it were the ſhaking of a skeleton, was plainly heard, even affrighting thoſe ſo affected.

The Conjunct Cauſe of this perhaps may ſeem to be, that the ſoft *interſtitium* of the Bones, *viz.* the Fat, Membranes, and Ligaments, being greatly waſted, their junctures even as milſtones, being altogether emptied by reaſon of their mutual rubbing together, make a noiſe: But the matter is quite otherwiſe, becauſe thoſe that are greatly waſted away have not this crackling noiſe of the Bones, nor do thoſe who labour with this Diſtemper always waſte off their fleſh: Wherefore we rather ſay that the immediate cauſe of this ſymptom, is the dryneſs of the Bones or a defect of the *medulla* or marrow ſo properly called, which ought to be contained within the cavities of the Bones, and chiefly within their heads: For as certain Bones do include marrow or an unctuous humour every where ſhaken out, either from the great cavities or pores, and the ſmall paſſages, we have determined the uſe of this to be, that both the Bones being thus moiſtned, may become leſs brittle, and moreover, that this humour moiſtning the knobs of the Bones, may make ſlippery all the joyntings, even as Greaſe or Oyl the hinges of a Machine, and by that means facilitates their motion: Wherefore the heads of the Bones being deſtitute of this marrow, make a noiſe like to the wheel of a Cart that is ſeldom greas'd.

But if the proctaartick or more remote cauſe be inquired into, *viz.* wherefore that

that unctuous liniment of the Joynts becomes defective; this indeed is to be imputed either to the vice of the Blood, as if it did not supply the Bones with aliment, participating equally with Sulphur and Salt, which truly seems unlikely, because the bloudy Mass also in scorbutical persons, contains Particles of either of the aforesaid kinds, and for that these labouring with the crackling of the Bones, have their Skin and Muscles sufficiently moistned with fatness: Or secondly and more likely, this unctuous humor by which the Joyntings are made slippery is wanting, through the fault of the Bones themselves, *viz.* because their pores and passages being so much obstructed by some extraneous, and perhaps muddy matter, or tartareous carried thither by the Blood, that for that reason they cannot receive sufficiently the Balsom destinated for them, nor send it forth for the moistning their Joyntings: It will not be easie (for that the matter lies so abstruse) to investigate the particular reasons of this Distemper, nor to conjecture further in this Ætiology.

We are no less at a loss, how to proceed in the cure of this Disease: For although the primaay indication, *viz.* the humectation of the Bones or Joyntings is obvious enough, yet by what means and by what Remedies that should be performed, does not so plainly appear. For I have known in this case very many kinds of Medicines, and several ways of Administrations tryed altogether in vain. A certain ingenious man, labouring for many years with this Disease, had taken the advice of many, and of the most famous Physicians, and besides the usual Remedies against the Scurvy, (together with often letting Blood and purgations, from which he received no help) he tryed various and long courses of Physick without any success: for after he had underwent a method prescribed by one Physicion for some months in vain, he applyed himself to another and so again to more. In the mean time, from each of them was prescribed always a new way of curing, unessayed by the former: Fomentations, Liniments, and Frictions are daily applyed to the Joynts, and sometimes the Baths at Bath were used, and then several sorts of purging waters, sometimes one sometimes another were drunk; all which nothing helping out, a chalybeate course was taken, and another time a decoction of the more temperate woods, sometime a Milk Diet, and again at another time Electuaries, distilled waters, *Apozems*, and other Remedies prepared against the Scurvy. After this manner when he had lived almost constantly medically and miserably above three years, and nothing profited as to the Cure of the aforesaid Disease, but in the mean time he was indifferently well as to his strength and Stomach, he married, and as to the rest of the common Symptoms of the Scurvy became better: Hence it appears too pertinacious a Disease, yielding almost to no Remedies, the crackling of the Bones is, which I have also proved in others, labouring with the same Distemper altogether mocking and eluding the skill and pains of the Physician.

CHAP. X.

Of the Vital Indication, in which are included Cardiack Medicines, Opiates, and Diet, or the manner of living as to Eating or Drinking, requisite in the Scurvy.

WE have hitherto largely unfolded the Indications both Preservatory and Curatory, which belong to the Cure of the Scurvy, it yet remains that we speak of the vital Indication, to wit, that we may declare by what method and by what Remedies, the strength of the sick being too apt to languish, may be sustained, or being lost and cast down may be restored. For these ends, Cordials and Opiates are prescribed to be taken, according to the exigencies of the sick, and besides a right way of living as to Diet, and if need be an analeptick or restorative, and always anti-scorbutick is prescribed.

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As to Cardiack Medicines, to wit, which thorowly agitate the Blood, ſtagnating in the heart, reſuſcitate or raiſe up its half ſpent flame, reſtore the animal Spirits oppreſſed or diſtracted to a free and due irradiation, it is obvious that very many Remedies which properly are called Anti-ſcorbuticks, do perform theſe intentions, of which ſort are the compound water of Radiſhes, the magiſterial of Snails and Earthworms, the Spirits of Hartshorn and Soot, the ſhelly Pouders with many others, which are not only taken with benefit at certain hours, according to a method ordained in a certain order, but alſo as occaſion ſhall ſerve when ever a *ſyncope* or fainting of the Spirits ſhall happen.

But beſides thoſe who are found very obnoxious to paſſions of the Heart, frequent Swoonings, Nauſeouſneſs, Vomiting, Tremblings; *Vertigo's*, and other horrid Symptoms, have alſo ready other ſorts of Medicines, more properly Cordials, by which they give relief immediately to their fainting Spirits. To this end is very convenient the *Elixir Vitæ* of the greater compoſition, in the diſtillation of the ſame *Elixir*, the ſecond water may be given to a ſpoonful ſweetned, alſo the Bezoartick Water, *Aqua mirabilis*, *Gilbert*'s temperate water, Treacle and Cinnamon water, to each of which compounded or of themſelves, may be added *Confectio Alchermes*, *Confectio de Hyacintho*, pouder of Pearls or the magiſtery of Coral, Syrup of Clove Gillyflowers, of Coral, of Citron peels, or of Cinnamon: Of theſe and others of this Rank, divers forms of Medicines are wont to be preſcribed, as for Example.

Take of Treacle water and *Aqua mirabilis* each ʒiij, of Balm water ʒiiij, of the Syrup of Clovegillyflowers ʒiſs, of the Confection of *Alchermes* ʒj, mingle them: The doſe 3 or 4 Spoonfuls.

Or take of *Aqua mirabilis* ʒvj, of Snails and of Walnuts each ʒij, of the Pouder of Pearls ℈j, Confection *de Hyacinth.* ʒj, of the Syrup of Clovegillyflowers ʒj, mingle them.

When ſcorbutical Women are wont to be troubled with hyſterical Diſtempers, or Men with Convulſive; take of Balm and Pennyroyal water each ʒiij, the compound water of Briony ʒiiij, of the tincture of *Caſtor* ʒſs, of the tincture of Saffron ʒj, of the Syrup of Clovegillyflowers ʒiſs, of *Caſtor* tyed in a rag and hung in the glaſs ʒj, the doſe is 3 or 4 ſpoonfuls.

For thoſe who had rather have Cordials in a ſolid form, Electuaries or Tablets are preſcribed.

Take of the Conſerves of Clovegillyflowers ʒiij, of the Confection of *Alchermes* ʒſs, of the pouder of Pearl ʒ, with as much as will ſuffice of the Syrup of Coral, make an Electuary.

Take of the *ſpecies* of *Diamargarit. frigid.* of *Diarrhodon Abbatis* each ʒiſs, of Pearls poudered, of the beſt Sugar diſſolved in Treacle water, and boyled up to Tablets ʒiiij, of the oyl of Cinnamon 6 drops, make Tablets according to Art.

As to what relates to Opiates and anodyne Medicines, in ſome diſtempers of Scorbuticks, I had rather want the uſe of any other kind of Medicines beſides than of theſe, for indeed I have found by often experience, that there is no better Remedy, not only againſt pertinacious pains and wakings, but in aſthmatical paroxyſms, in Vomiting, Fluxes, and alſo in the *Vertigo*, and in the Convulſive Diſtempers, as often as nature being irritated or provoked above meaſure, hath fallen into moſt cruel inordinations, than that Sleep might be allured by ſome ſafe Narcotick being given: In the mean time there is need of caution, that they be not taken when there is any thing in the conſtitution of the Sick, or in the condition or time of the Diſeaſe, that may forbid the exhibition of ſuch a Medicine.

Beſides the hypnoticks uſual in the Apothecaries Shops, *viz.* Opiate, *Laudanum*, *Nepenthe*, *Philonium*, *Diacodium*, and Syrup of wild Poppies, I know two preparations of *Opium*, which I am wont to give in the form of a Tincture or more liquid extract, with any other appropriate Liquor from 10 to 20 drops.

Diet or the manner of living, to be obſerved by Scorbuticks in the curatory method, is not of the leaſt moment, which being neglected or ill inſtituted, the other preſcripts of Medicine profit very little or nothing towards health: As the dietetick Rule extends it ſelf to various things, yet chiefly it is imployed about the Air, the ſoyl of the habitation, Meat and Drink, and the motion and reſt of the Body.

As to the firſt, what kind of places and manſions in reſpect of the Heaven and Soil, do breed the Scurvy, and therefore ought to be avoided, appears ſufficiently by

by what we have above declared. Thoſe who ſtudie to prevent or to cure this Diſeaſe, let them endeavour to choſe an Aire moderately hot and dry, and which ſhall be alſo thin and pure and ſufficiently eventilated or winnowed.

Meats only for good Juice and well cooked are convenient; heavy, ſlimy, putrefied, fennewed and meats dryed in the Smoak, alſo unfermented aliments, or greatly compounded, Pulſe, Milkmeats, and unripe Fruits are to be ſhunned, Sweatmeats or things candied, or very much imbued with Sugar, I ſo much blame, that I am apt to think the Invention and immoderate uſe of them, to have contributed very much to the cruel increaſe of the Scurvy in this Age. For indeed that Concreet is made up of a Salt ſufficiently ſharp and Corroſive, though mitigated with Sulphur, as may plainly appear by a Spagyrical *Analyſis* made of it. For Sugar (as we intimated before) being diſtilled by it ſelf, yields a liquor, little inferior to the Stygian Water: for if you ſhall diſtil it, being poured to a good deal of ſpring Water in a Bladder, although the fixed Salt does not ſo aſcend, yet it produces a Liquor like to the ſharpeſt *Aqua vitæ*, burning and highly pricking: Therefore as Sugar being commixed almoſt with every aliment, is ſo plentifully taken in by uſe, it is very likely that from its daily uſe, the Blood and the Humours are rendered ſalt and ſharp, and from thence Scorbutick. A very famous Author hath attributed the cauſe of the Engliſh Phthiſick, or Conſumption, to the immoderate uſe of Sugar among our country men, and I know no reaſon, but that I may rather think the increaſe of the Scurvy derives it ſelf from this enkindling.

Let the Drink be midling Beer, mild and clear, and altered with antiſcorbutick Ingredients, but without any ingrateful taſte; let it not be thick nor ſweet, nor too ſalt and ſour, and let it be taken in a moderate quantity, and almoſt only at the ſet times of Dinner and Supper: That which with many is thought a good Cuſtom, to wit, that as ſoon as they are out of their beds, to indulge themſelves with (as they uſually ſay) a large mornings draught, ſeems to be very pernicious. For by this means, for that the ſanguiferous Veſſels are too much filled with the proviſion of freſh Chyle, almoſt perpetually poured in, both Crudities and morbifick Fæculencies are begotten in the Blood, and the office of Sanguification greatly weakned. It is better indeed for moſt men (unleſs ſuch, who whilſt they are empty and uſed to have their Ventricle grievouſly wrinkled and drawn together) to remain faſting till dinner, nor is it a leſs adverſary to health, according to the uſual cuſtom, to fill themſelves with drinking full Cups preſently after Dinner. Wines or Cyder ſo they be mild, right and not adulterated, and moderately taken, do not hurt; but there is nothing more hurtful and injurious to our health, than thoſe adulterated, ropie, ſharp and growing ſour.

Exerciſe and Labour is ſo very profitable, both for the curing and the preventing of the Scurvy, that many by this remedy only have recovered their Health, or preſerved it intire: For in thoſe leading an idle and ſedentary Life, the Blood and nervous Liquor like ſtanding Water contract a ſlimyneſs and muddy ſetlement: But by much and aſſiduous motion of the Body, the Humours and the Spirits grow clear and vigorous, the excrementitious and heterogeneous Particles evaporate, the ſtuffings of the *Viſcera* are diſcharged and their tone ſtrengthned.

CHAP. XI.

Some Hiſtories and rare Caſes of Scorbuticks.

Obſervation. WHat we have thus delivered, concerning the Theory and the Cure of the Scurvy, ſhall be yet illuſtrated more clearly by examples of ſickneſs, or by Hiſtories brought to light and explained according to the aforeſaid *Hypotheſis*. As there are manifold and divers caſes extant of thoſe labouring with this Diſeaſe, we ſhall here propoſe ſome more rare, excited by reaſon of the Taint being affixed in the Brain and nervous Stock, no leſs than in the Blood.

A Gentlewoman, tall and handſome, about 25 years of age, had contracted the ſcorbutick Taint by reaſon of various errors in living, or manner of life, the ſigns of which were a ſpontaneous wearineſs, difficult breathing, pains and ſpots in her Legs, beſides her Gums ſwollen and bloody; in the ſpring time after miſcarriage falling into a tertian Feavour, ſuddenly ſhe became languiſhing and weak, from which diſeaſe, however ſhe had been quickly recovered, being at firſt methodically cured, but that greedy of fleſh and other incongruous things, ſhe ſoon fell into a Relapſe. But then growing weary of Medicine, ſhe took only empirical Remedies, by which ſometimes her Ague fits were driven away, then ſoon after they returned: In the mean time ſhe remained pale, weak as to motion, breathing ſhort and ſwollen, and blown up near the Ventricle and *Hypochondria*. About the third month of her ſickneſs ſhe began to feel cruel Pains and Torments in her Belly; which afflicted her almoſt continually night and day, running about, now at her Back, now in her Stomach; Beſides ſhe was affected ſometimes with hyſterical Fits, and with a frequent Vertigo, alſo being troubled with often Vomiting, ſhe dayly caſt forth a clammy and frothy Flegme. Within a months ſpace this Diſeaſe diſplaying its ends, ſtirred up Pains in the Back, Loyns and then in every part of the Body. But at this time ſhe complained of a great ſtraitneſs of her Breaſt, and a great contraction of the *Viſcera*. In the mean time the habit of her Body became very lean, that the Bones being deſtitute of fleſh, the Skin could hardly ſtick on them. Her Urine was little and red, on whoſe Superficies was a little Skin coloured like the tail of a Peacock. A little time after this, ſhe felt a ſtupor or numneſs and a ſenſe of pricking, ſometimes in her Belly, and ſometimes in her Limbs, and then the Pains and Torments began to be remitted, but in their place a Palſie ſucceeded, which within the ſpace of a week ſo invaded the Members of her whole Body, that ſhe could neither bend her hand or foot or any other part, nor move one jot from the place.

The Reaſons.

As to the Ætiology or the reaſon of the aforeſaid caſe, this is plain that theſe more grievous Symptoms did wholly ſpring from a ſcorbutick Root; for by reaſon of the Taint being fixed chiefly in the Blood, the ſpontaneous wearineſs, the difficult breathing, and alſo the intermitting Fever wavering and often returning, and other previous and as it were more light Skirmiſhes of Symptoms were induced: further, the lixivial Urine and of variety of Colours, plainly indicated or ſhewed, a Blood corrupted with a ſulphureous Saline dyſcraſie or evil complexion: which kind of Piſs by that means well known, I have taken notice of in ſeveral others affected with the like Diſeaſe. But when the morbid Seed in this ſick Gentlewoman, being plentifully increaſed, and flowing thorow the Maſs of Blood, did ſpread into the confines of the Brain and nervous Stock, the more grievous diſtempers did then ariſe; to wit, the morbifick Matter, conſiſting of heterogeneous and irritative Particles, being depoſited within the Brain, brought in the *Vertigo* and Swimming, or turning round, and the ſpaſmodick or cramplike Diſpoſition; then a Portion of it falling upon the Nerves of the intercoſtal and moving Pair, and being by their paſſages caſt upon the meſenterick Foldings, ſtirred up the ſcorbutick Colick; and when the ſame matter being hugely increaſed, had come to many other Nerves, the painful Diſtempers were propagated almoſt into every part of the Body; for that the acid Recrements like to vitriolick *Stagmas*, being depoſited every where from the nervous Liquor, did incounter with the lixivial Salts, every where alſo poured forth from the Blood: Then laſtly when all the Nerves being by degrees filled and ſtuffed with the morbifick Matter, were ſo much obſtructed that the irradiation of the Spirits and their commerce were hindred, the Palſie followed upon the whole Body.

The Cures.

This Gentlewoman living far from hence, had taken Medicines by the advice of a neighbour Phyſician, uſual againſt the diſtemper of the Colick; notwithſtanding which, when the Diſeaſe grew grievous, the Patient being brought to *Oxford*, made tryal of very many Remedies, both Antiſcorbutick and Antiparalytick almoſt of every kind and form, but without any benefit. Therefore after that every ordinary method of Curing, ſeemed not ſufficient for this Diſeaſe, it was thought good to proceed to great Remedies, and indeed not altogether free from danger: wherefore we adminiſterd to her, as ſick, weak and lean as ſhe was, a mercurial Medicine for ſalivation. The effect of which ſucceeded to wiſh, for the Flux at the mouth being riſen within two days,

days, and perſiſting gently for many days without any evil Symptom, brought great eaſe to this Gentlewoman. For the Pains being mitigated, ſhe began to move a little her Members, and to deſire and to digeſt better her Food, and alſo to enjoy quiet Sleep. The Salivation being finiſhed, ſhe took a Decoction of Sarſa and China with Antiparalytick ingredients for a few days; then being carried to the Bath, ſhe there uſed for ſome time the more gentle and temperate Baths, and preſently recovered an indifferent ſtate of Health. All the Winter, ſhe conſtantly took Medicines againſt the Scurvy and the Palſy, and when the following year, ſhe repeated the uſe of the Baths, ſhe grew perfectly well, and afterwards became the joyful Mother of ſeveral Children.

Obſervation. A Man about 40, of a Melancholy temper, labouring for many years with the Scurvy, was wont to be ſenſible of divers and manifold Symptoms of it, at ſeveral times of the year. There appeared about his Thighs Spots and black large marks as if coming of ſtrokes; pains of the Belly, with a Looſeneſs often troubled him; his Urine for the moſt part appeared like Lye, and he almoſt conſtantly had a ſpontaneous wearineſs, a failure of his ſtrength, and a want of Appetite: Beſides theſe ordinary evils, and as it were cuſtomary, he lived obnoxious to moſt cruel Fits of Sickneſs, and thoſe of various kinds. Two years before when I firſt ſaw him, he complained moſt grievouſly of a difficulty in Breathing, as if he were in danger to be choaked, with a trembling of the Heart, with a fainting of the Spirits, and of a conſtant fear of Swooning: Beſides if any of theſe diſtempers in the *Præcordia* ceaſed a little, for the moſt part an heavy giddineſs in the head, and *Vertigo* aſſaulted him. After that he had taken for ſome time Antiſpaſmodick and Antiſcorbutick Remedies mixed together, he ſeemed to be perfectly well; but then within a few weeks he was affected with a nauſeouſneſs and pain about the Heart, with an inflation of the *Hypochondria*; his Urine was little and very lixivial, and ſhortly after the *Abdomen* ſwelled up, and then his Feet and Legs with a great wateriſh ſwelling, ſhewed the ſigns of a growing Dropſy: afterwards the ſame Tumour invaded the fleſh of his Thighs, Arms, and Back alſo: which Diſtemper however though it ſeemed deſperate, was eaſily cured with antiſcorbutick Remedies, with the addition of Catharticks and Diureticks. But yet this remarkable perſon, although he was reſtored to health, did not continue ſo long: for two quarters of the year were ſcarcely paſt but he began to complain of a grievous Head-ach, with a *Vertigo* and a pertinacious waking, and then without any evident cauſe, he was taken with moſt horrid Vomiting: a little while after, his aſthmatical fits, with the trembling of his Heart and ſinking down of his Spirits, returned. Alſo at this time, when he almoſt ſeemed deſperate, he again grew well in a little while, with the uſe of antiſcorbutick Medicines. It plainly appears by this caſe, how many evils the ſcorbutick infection, like to Ferment lying hid both in the Blood and nervous Juice, and as occaſion ſerves, ſpreading abroad its Poyſon, can cauſe; which kind of diſtempers, how horrid and terrible ſoever they ſeem, whilſt they depend only of the Humors vitiated in their Complexion, and that the *Viſcera* are not at all hurt in their Tone or Conformation, are wont to be cured moſt commonly very eaſily, or without much trouble, *viz.* with an antiſcorbutick Method aptly deſigned, both according to the condition of the Patient, and of the Diſeaſe.

Obſervation. A Lady about 25 years of Age, of a ſanguine Complexion, of a ſlender make of Body, of a fair skin and beautiful, had laboured for ſome time with the ſcorbutick diſtemper; for beſides broad ſpots and red ſwellings breaking forth in divers parts of her body, ſhe was wont to be troubled of a long time with cruel pains and torments, chiefly vexing her at nights, ſometimes in her Legs and ſometimes in her Arms: She had often begun to take Phyſick for the Cure, but being with Child was forced to give it over. After her laſt Child, for that ſhe had great fluxes, ſhe remained for many days languiſhing and weak, with difficulty of breathing, and upon any motion breathleſs. Being riſen up after lying in her month, and endeavouring to walk ſhe fell into a moſt grievous *dyſpnœa* or ſhortneſs of breath, with the trembling of the heart and a frequent fainting or ſinking of the Spirits: Being preſently put to Bed, yet trembling and with quick palpitations, ſhe continued ſo for almoſt a whole day; beſides her lower Members as if they had been dead, were altogether ſtiff and cold, and could not be made warm with the applications of warm cloaths or by rubbing: At length the night being almoſt paſt, ſhe found her ſelf better about her *Præcordia*, ſtrong Cordials having been often adminiſtred to her, but there ſucceed-

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ed a very acute pain on the top of her Thigh nigh to her left Groin, reaching even down to the Calf of her Leg,and within a few hours a hard tumor reſiſting the touch, poſſeſſed all that ſpace. Being ſent for at this time whilſt the ſick was gaping for breath, a Clyſter being preſcribed and taken, I gave her 12 drops of the Spirit of Hartshorn, in a ſpoonful of the following Julap, ℥ij of the ſame being drunk afterwards. Take of the water of Snails ℥vj, of hyſterical water ℥iiij, of Walnuts ſimple and of Pennyroyal each ℥iij, of Sugar ℥j, of *Caſtor* tyed in a Rag and hung in the Glaſs ℥j. Theſe Medicines were repeated every ſixth hour. I took care to have a large Veſicatory to be applyed to the inward part of her Thigh, then in the evening for that ſhe had continued all this fit without any ſleep,I gave her j grain of *Laudanum*, of the pouder of Pearls vj *gr.* of the Confection of *Alchermes* without Musk ℥ß: She ſlept quietly, and in the morning was very much refreſhed, the pain and tumour of her Thigh were ſomewhat abated, alſo while ſhe lay quiet in her bed ſhe was well at her *Præcordia*, but if ſhe ſat up or turned of one ſide, ſhe preſently ſeemed as if ſhe would expire with the *dyſpnœa* or want of breath. She continued to repeat the uſe of the Hartſhorn and Julap every ſixth hour for ſome days; but becauſe ſhe was oppreſſed with a troubleſome thirſt, and that her Urine was little and the Contents red and high coloured, ſhe took a doſe to ℥vj twice a day of the following *Apozem.* Take of Graſs Roots, Chervil, *Eringo*'s preſerv'd, each ℥vj, of the ſhavings of Ivory and of Hartshorn each ℥ij, of Hartshorn burnt ℥jß, of Raiſins of the Sun ℥ij, 1 cut Apple, of Liquoriſh ℥ijß, being cut and bruiſed let them be boyled in 3 pints of Spring water, to the conſumption of the third part; then add of Whitewine ℥iiij, let it be ſtrained into a Jugg,to which put of the leaves of Scurvygraſs and of Brooklime each *m.* j, of the Salt of Wormwood ℥ij, make an Infuſion cloſe ſhut and warm for 3 hours, being ſtrained let it be kept in cloſe Veſſels: Sometimes every day,ſometimes every other day they gave her Clyſters. By the daily uſe of theſe ſhe ſeemed to be better, ſo that within the ſpace of a Week ſhe was able, being raiſed from her bed, to ſit up in a Chair by the fire ſide for 2 or 3 hours: But if ſhe ſat up a little too long, or did but endeavour to ſtir, ſhe preſently fell into an aſthmatical fit or *dyſpnœa*; ſo that one day having ſtayed ſomewhat longer out of her Bed,having ſuffered a moſt heavy aſſault of the Diſeaſe, ſhe was afflicted with a difficulty of Reſpiration, with a trembling of her whole Body, and continual ſinking of her Spirits: By reaſon of this Relapſe of the ſick Lady, at laſt I being ſent for, gave her 20 drops of the Spirit of Hartshorn with the above preſcribed Julap, and at night a doſe of our *Laudanum*; but when ſhe began to be better about her *Præcordia*, the pains and tumors ſucceeded in her right Thigh and Leg as had happened before in her left: I alſo ordered a Veſicatory to be applyed to that Thigh, and beſides the Remedies hitherto cited, ſhe took twice a day of our Wine of the Juice of Scurvygraſs ℥iiij, with ℥ij of the magiſterial antiſcorbutick water. Beſides I ordered a Purge of our ſolutive Syrup above preſcribed, which ſucceeded ſo well,that I repeated it again within 3 or 4 days. With theſe Remedies ſhe grew well within a Month.

As to the Reaſons of the Symptoms obſerved in the aforeſaid caſe, firſt it is obvious from the ſpots and pains of the Limbs, that the Blood and nervous Juice had been for a good while touched with the ſcorbutick taint, which notwithſtanding lay hid within the aforeſaid humours, as it were ſubjugated and without any ſignal evil, ſo long as they were ſtrong in the vital and Animal Spirits: But after the great hæmorrhage or flux of Blood, when the Blood and nervous Liquor grew weak in their *Craſis* or Complexion, the particles of the morbid ſeed like to ferment, being moved, ſtirred up thoſe terrible diſtempers: That grievous *Dyſpnœa* or want of breath, ſeemed to ariſe from a double cauſe, or a concourſe of a double evil,to wit, becauſe certain pneumonick Nerves being beſet with the ſcorbutick matter,were hindred as to their office of Reſpiration: For from hence there was a neceſſity that the Lungs ſhould be ſwiftly moved, that they might draw the Blood from the heart,and the act of Reſpiration being more weak by reaſon of the Nerves being hindred, it became therefore more ſhort and very laborious: A fit of the *Dyſpnœa* urging,when as the Blood about the *Præcordia* was very much agitated, the extreme parts (which were then almoſt wholly wanting) by reaſon of its abſence grew ſtiff and cold; afterwards when as the Spaſms or Convulſions of the Lungs abated, and that the Blood being greatly imbued with the morbifick matter, which it had there ſupped up,looſned from its ſtagnation, was returned to Circulation, that ruſhing impetuouſly into her Thighs, firſt into her left, then into her right, the other being deſerted and

The Reaſon.

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ſo overflowing its Channels, being extravaſated with the ſerous filth, cauſed that ſudden tumor with the red ſwelling. But by reaſon of the ſhifting of the morbifick matter into the more ignoble parts to and again, the Diſeaſe though it ſeem'd very dangerous, eaſily gave way to Remedies, altering the dyſcraſies or evil diſpoſitions of the humors, and gently carrying away the Reliques of the morbifick Mine.

Obſervation.

A Noble Gentleman about 33 years of Age, of a ſanguine Complexion as he ſeemed to be, tall and ſlender, of a very ſharp wit and great underſtanding, although he had exerciſed himſelf very much for a long time in immoderate and unſeaſonable ſtudies, together with an inordinate way of living, yet to that time being freſh and full of vigor, he ſeemed to enjoy a whole mind in a ſound body; a little more than two years before, when he had very much tyred himſelf in dancing a whole night among his Gueſts, in the morning going into a cold Bed in a Chamber ſomewhat moiſt, deſirous of a little Sleep he began to be Sick; for being awaked he fell into great perturbations about the *Præcordia*, with great fainting of the Spirits: After having taken a draught of Wine and ſome Cardiack Remedies, he was ſomewhat better; but by and by he relapſed, ſo that both himſelf and his friends feared all that day a mortal ſwooning or an imminent Apoplexy. But after this Aſſault of the Diſeaſe had paſſed over, he lived after that ſtill obnoxious to daily paſſions of the Heart, and upon any more great error in living, he was wont again to be troubled with moſt grievous fits. Notwithſtanding the uſe of Remedies, the Diſeaſe increaſing upon him within a few Months, it not only infeſted the *Præcordia*, but in the whole habit of his Body, Suffuſions ſometimes of cold, ſometimes of heat, and beſides a *ſtupor* or numneſs, or ſenſe of tingling or pricking, or light and ſudden Convulſions or Contractions in his Limbs were excited: And of late beſides theſe Symptoms ſpoken of already, which although they were very grievous to this Noble Gentleman, yet he was further troubled after a terrible manner with a frequent *Vertigo*, and with diſtractions and decay of the Spirits, that inhabit the forepart of the Brain, inſomuch that he was forced to abſtain from Studies and Political Affairs (to which he was always addicted) yea and from every more ſerious intention of the Mind; for otherways he felt thoſe ſort of perturbations both in the Head and in the Nervous Stock, that made him fear an Aſſault of the aſtoniſhing Diſeaſe, or moſt horrid convulſive Affections: Whilſt he had the more grievous Fits of this Diſeaſe, his Ventricle alſo was diſturbed for the moſt part, but he often received eaſe by Vomit, either by the free aſſiſtance of Nature, or by the help of an emetick Medicine. Hence ſome thought the cauſe of the Diſeaſe, to ſubſiſt altogether about the Stomach or the *Hypochondria*, but Catharticks, Emeticks, Digeſtive, Cephalick, Anti-ſcorbutick, Chalybeate, and other Medicines almoſt of every kind, preſcribed him for two years by the moſt famous Phyſicians, and alſo by Empiricks and Quacks, profited little towards the Cure of the Diſeaſe. Of late having tryed *Aſtrop* waters, he found himſelf worſe for the uſe of them, preſently deſiſting, he was next adviſed to be carried to the ſulphureous waters at *Knaſborough* in *Yorkſhire*, but with what ſucceſs I have not as yet learned.

This caſe becauſe by reaſon of the Concourſe of various Symptoms, it can belong to no other kind of Diſeaſe beſides, is not undeſervedly referred to the Scurvy; for it may be ſuſpected that the procatarctick or Remote Cauſe of this Sickneſs, lay in the evil diſpoſition of the Blood, to wit, that its Liquor was degenerated from a Balſamick and a ſpirituous, into a ſharp and ſulphureous-ſaline, by reaſon of theſe Elements being carried up above meaſure, which indeed ſeems to have happened partly from Errors in living, for that this Noble Perſon being often kept by buſineſs or more ſerious Studies even till Midnight, was wont to ſup at that time, and preſently to go to bed to ſleep: Further, this Diſeaſe did partly ariſe from a ſickly diſpoſition of the Spleen, and perhaps of the other *Viſcera*, ſupplying the Blood with a morbid ferment, neither is it altogether without reaſon, that we judge the Spleen ſhould be accuſed.

The Reaſon.

The Blood labouring with the aforeſaid Dyſcraſie, and from thence gathering together heterogeneous Recrements, eaſily poured the ſame on the head, being helped by the evident cauſe: Wherefore when the Brain by reaſon of immoderate and untimely ſtudies, being ſomething debilitated became leſs ſtrong to reſiſt the evils, and when for that occaſion before cited, the bloody Maſs being carried up into a greater ebullition, the pores of the whole Body being by and by ſhut up, it could not be ſo well eventilated, its great ſuffuſion or ſpreading into the head brought

brought on the firſt manifeſt ſickneſs, to wit, from the Blood too much heaped up about the Region of the Head, firſt the ſwelling up and *Phlogoſis* or inflammation of the Face came: Further, from the ſame at that time impetuouſly ruſhing on the borders of the Brain, and there ſtagnating the heterogene Particles, partly Narcotick, partly exploſive, fell down into the Origin of the Nerves, which being ſo beſet with incongruous matter, thoſe perturbations ſtirred up about the *Præcordia*, (for the Reaſons ſhown in the ſpaſmodick Pathology) did ſucceed. Further, for as much as the ſame matter being dilated towards the hinder part of the head, coming upon the Nerves, ariſing from the ſpinal marrow, it invaded the extreme paſſages and proceſſes of them all, and ſtirred up through the whole Body, a *ſtupor*, pricking, and the lighter Cramps or Convulſions. Moreover, becauſe the Nerves and their branches compaſſing about the ſanguiferous Veſſels, being affected with Convulſions were variouſly contracted, thoſe ſudden diffuſions or ſpreadings of heat and cold, by reaſon of the Bloods being as it were ſometimes reſtrained with a Bridle, and ſometimes agitated forward with a Spur, did ariſe through the whole Body.

About the beginning of the Diſeaſe, becauſe the morbifick matter being ſuggeſted from the Maſs of Blood, breaking forth firſt either on the Region of the Cerebel, or if admitted into the Brain, being from thence preſently ſent forth, it fixed chiefly about the original of the Nerves, therefore the chief taint appeared in the nervous Appendix, and about its exterior proceſſes without any *Vertigo* or previous ſwimming or Scotomy, or any notable hurt in the chief powers of the Soul: But afterwards by reaſon of the dyſcraſie of the Blood being daily increaſed, and the conſtitution of the Brain or *Encephalon* being more weakned, the heterogeneous Particles alſo breaking through into the anterior Brain, or the regal Palace of the Soul, they brought on both the diſtractions and meltings or ſinking down of the Spirits inhabiting there: So that this Diſeaſe after that its Roots being once planted ſomewhere within the *Encephalon*, did daily ſhew its intentions, notwithſtanding the uſe of Medicines, as that at firſt only the original of the nervous wandring pair, and the intercoſtal were infected, and then afterwards the morbifick matter entred into the proceſſes and interior paſſages of the other Nerves of the whole Body, which being filled full, at length that being carried by the as yet impure Blood into the Brain it ſelf, it poſſeſſed its more noble Cells, which kind of Cephalick Diſtempers, I have obſerved to have made the like progreſs in many, ſo that it plainly appears theſe Symptoms excited by ſuch a *Series*, ariſe by reaſon of the aforeſaid Cauſes, and not from Vapours ſuppoſed to be elevated from the *Viſcera* or inwards.

But that a fit urging oftentimes the Ventricle was diſturbed, alſo that it was wont to be ſuddenly eaſed by Vomit, it will not be difficult to ſhew the reaſons without prejudice to this *Hypotheſis*. As to the firſt, there is nothing more plain than that the Ventricle is ſubverted, and that a nauſeouſneſs or Vomiting doth ſucceed, by reaſon of ſome grief inflicted on the Origin of the Nerves, as we have at large already declared, then there is more reaſon for that Vomiting ſhould bring preſent help: For in the firſt place, as the Nerves of the wandring pair and the Intercoſtal are very much ſhaken, (as it is the manner of the Nervous Parts) they preſently remit their inordinations excited from an internal cauſe, as an itching or pained member is freed from grief if it be ſcratched or rubbed. But the aforeſaid Nerves being greatly ſhaken together and contracted in Vomiting, they eaſily ſhake off the morbifick Matter, fixed to their ends or extremities; by which it comes to paſs, that oftentimes a ſharp or acid Matter, or otherwiſe infeſtous, being heaped up within the firſt Paſſages, and there either infecting the Blood, with its hurtful Ferment, or irritating the nervous Bodies into Convulſions, is brought away by Vomit, and ſo the Fountain or Provocative of the Diſeaſe is carried forth.

As to the therapeutick or curatory Method, to be uſed in this caſe, and others like it, there are two intentions which are chiefly to be inſiſted on, *viz.* In the firſt place to make pure the Maſs of Blood, and to bring away the noxious Ferment adminiſtred from the Ventricle, Spleen, and other *Viſcera*. Secondly, that the Brain and nervous Stock be ſtrengthned, leſt they admit of extraneous Particles: and that the nervous Juice watering thoſe parts, degenerating from a right into acetous or otherwiſe morbid *Craſis*, may be rectified and reſtored. The firſt of theſe are to be performed by Catharticks, Emeticks, Phlebotomy, and cheifly by ſpecifick Medicins, correcting the ſcorbutick Taint of the Blood, or carrying it quite away: But as to this Iron or Vitriolick Spring, celebrated for the purging the

Blood,

Blood, that they were rather hurtful than helpful to this Gentleman, the cauſe ſeems to be, both for that the Brain being made weak by reaſon of thoſe Cephallick Diſtempers, hardly excluded the filth of the Water ſent from the Blood, but was in danger to be overflown, by its falling more furiouſly upon its Confines; and alſo becauſe when the nervous Liquor degenerating from its *Craſis*, turns ſour, it is wont to be more perverted by the fluid Salt of thoſe purging Waters. Wherefore we have ſtill obſerved, that the drinking thoſe Waters, in a Rheumatiſm and the Gout, hath increaſed the morbid Diſpoſition. The ſecond intention is beſt inſtituted by cephalick Remedies, and chiefly thoſe indued with a volatile Salt, of which ſort are Spirits, and Salt of Blood, Soot, and Harts-horn, of the Roots and Seeds of Peony, the leaves of Miſletoe, *&c.* With which Antiſcorbuticks may be mixed.

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TO THE

RIGHT WORSHIPFUL

Sr Theophilus Biddulph

KNIGHT and BARONET.

Honoured Sir,

I Have presumed to Dedicate these my labours to you, being the Translation of a most Worthy and Learned Author, Dr. Tho. Willis *his Works, out of the* Latine *into our Mother Tongue, for the benefit of my Country-men: and knowing you have always been a general, and generous* Patriot, *a lover of your Country, and of all manner of Industry and Ingenuity, I question not, but you will kindly receive this my Dedication; though not for my sake, yet for the many admirable things that may be found in the Book it self, and for the good and benefit, which this my laborious task may bring to the publick. As I doubt not of your innate Goodness, having already had some particular experience thereof, so I shall no ways fear an unkind reception: And although I launch not into the sea of your Praises, as is the late custom of* Dedicators *to do, I am perswaded, that this my plain Epistle will be as kindly accepted; for I know you to be so modest a Man, as not to love to see all your good Actions, Virtues and worth, Rhetorically painted and laid open before your Eyes: for as your Worth is too well known, this way to receive any addition; so the praise thereof being needless, will rather cause you to blush, than be any ways pleas'd. But yet I cannot forbear to take notice to the World, that your whole Life has*

been a true pattern of Loyalty and Religion, which in theſe troubleſome and diſtracted times, may be worthily related and mentioned, as a praiſe-worthy Example for others to imitate and follow: and that you are both a true lover of the Church of England, *your King, and Country, which you have eminently ſhew'd in all your Actions, and manifeſted to the World, by your ſeveral publick Employs, in the behalf of your Country, and of the Renowned City of* London, *of which you are a moſt worthy Member. And no doubt, but that it is for this your ſtedfaſtneſs in Religion, your Loyalty to your Prince, your Love to your Country, and your uprightneſs in your Dealings, that God hath ſhowered on you all manner of external Bleſſings, giving you a fair Eſtate, through your own Induſtry, Wiſdom, and Prudence, a Virtuous Conſort, and a proſperous Iſſue, the fair and flouriſhing Branches of your Ancient Stock and Family: To all which outward felicities, I ſhall pray, That God may alſo indue your noble Soul with the Celeſtial and Eternal Bleſſings and treaſures of the World to come, and that you may be conſtantly happy both here and hereafter. I remain,*

Honoured Sir,

Your moſt humble

and faithful Servant,

S. PORDAGE.

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IN EVERY

BODY.

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Tranſlated into Engliſh by *S. P.*

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MDCLXXXI.

BODY

TO THE

Moſt Reverend Father in Chriſt

And the Right Honorable

HIS GRACE,

GILBERT:

By Divine Providence Arch-Biſhop of *Canterbury*, Primate and Metropolitan of all *England*, and one of His Majeſties moſt Honorable Privy-Councellors.

Moſt Holy Prelate,

THE *Eagle will not acknowledg his ſuſpected Chicken, by one only ſign, for it is not enough that it can look againſt the light, unleſs it be able alſo to behold the Sun's Beams without winking*: *and indeed altho this our haſty iſſue, whether by the help of its own blindneſs, or of that doubtful light in which it liv'd, hath been able to come abroad, yet it hath not ſufficiently given marks of its true race, until it might delight its Eye with your brightneſs as at the Sun's Beams.*

Theſe Meditations or Diſcourſes tho ſeveral times publiſhed, now therefore at length boaſt, that they are able to ſhew themſelves to the light firſt, with your Sacred name in the front, it is then but reaſon, that the ſame Mecænas, *who hath brought me forth into the open light, from my own darkneſs, and from the filthineſs, and ſoot in which I was involved, being condemned among the*

metals; ſhould think not it any detraction, to lend to my Works Ornament, and Splendor, as well as to the Author and Publiſher.

It was by your means (moſt Noble Prelate) that I obtained the Votes in this Famous Univerſity for the place of Sidly Profeſſor, *for how ſmall ſoever my Merits might ſeem, they were helped by the greatneſs and weight of your opinion.*

I am exceeding conſcious to my ſelf, how unfit, being deſtitute of all help, I came to that Province, both for the Dignity of the Place, of the Univerſity, and of my Mecænas, *yet I believe nothing is to be diſpair'd of, under ſo great Auſpicies. I would therefore, if there be any thing, at any time, more happily thought of, in the ſcrutiny of Nature; and brought forth by me, that it be not referred to my Ingenuity, or (which I might perhaps more truely deſerve) my Induſtry, but to the Influences of my Patron: For to him only he Dedicates and Conſecrates himſelf and all his, who is*

Your Graces moſt humble

And for ever obliged

Servant, *T. W.*

THE

THE PREFACE.

THE ſame thing happens to me, about to ſpeak of Fermentation, that once did to a Famous Hiſtorian, when he wrote his Commentary of the *Roman* Empire, to wit, whilſt he endeavoured to draw forth, as it were in a little Table, the affairs only of that Nation, he was neceſſitated not only to recount the Actions of one people, but of all man-kind: in like manner, whilſt I did meditate on a few things only concerning the energy, and the means of the working of Ferments, I have brought into this Tract, as it were ſwelled up with a certain Ferment, the whole Proviſion, and Dowry of all Nature. Entring upon this Diſquiſition, I thought I had been tyed only to the Bakers Oven, and Brewers Furnace, being condemned to the Mill, not to have proceeded beyond their limits, unleſs by chance, or with leave; but after that I had begun to look more deeply into the matter, I perceived I had gotten a far more large Province: Becauſe it plainly appeared, beſides theſe of Art, very many Works of Nature, to be not only like, but themſelves the effects of Fermentation: For when, for the ſolving of the Phœnomenas, which are met with about the ſwelling up of the mealy Maſs, and the working of Wine, and of other Liquors, I had Compoſed divers Arguments, Reaſons, and Hypotheſes, I found at length, thoſe firſt begotten Particles, by whoſe Orgaſm or Heat, thoſe vulgar preparations do Ferment, to beget the Cauſes of motions, and alterations, in whatever things they are mix'd with beſides; wherefore, I may be pardoned, if I have ſtrayed far from our propoſition, and have ſeemed to any one, to have heaped together here, too plentiful an Harveſt of Matter, becauſe I was wholly led by the ſame thrid of Ratiocination, and the moſt conjunct Affinity of things, to theſe various and diverſe Concretes. If any one ſhall object,

ject, that I proſtitute the unuſual Notions, and almoſt only heard of, in the Shops of the Chymiſts, unhandſomly among the works of ordinary people, I ſay, theſe Principles, which being brought indeed to perform the ſelf moving motions of Natural things, alſo more eaſily to repreſent them to the vulgar capacity, and lay them not only before their Eyes, but even into their very Hands; what of theſe kind of ſubſtances, I call Particles, men tho rude and unskilful, may perceive even by the help of their ſenſes to be in the things: beſides the names of Sulphur, Salt, and Spirit, and the reſt, are more familiarly known, than Matter, and Form, or the four Principles of the *Peripateticks*. As to our method, and manner of Philoſophizing, no man can blame me, if I ſhould not here deſcribe all things according to Rule, and Analytick Patterns; becauſe in this Work, it chances for me to wander, without a Guide, or Companion, in ſolitary places, and as it were in a ſolitude trodden by no footſteps, where I not only make a Journey, but my way alſo: therefore, when ever I deviate, I cannot be ſaid to err, among right Judges of our endeavours, who have no Path in which I ſhould Walk, nor could find a Track, which I might fear to miſs.

ON THE

AUTHORS

Medical-Philoſophical Diſcourſes.

THE intricate and hidden cauſe of things,
Both Peace and Strife by what means Nature brings,
What various motions Bodies do inſpire;
What mixes with the Waters quenchleſs Fire?
What Bonds the Elements together tye,
Before this happyer Age unfolded lye:
Things hid to former Ages, and unknown,
The Secrets of the world to all are ſhown.
Metals dug from the Bowels of the Earth,
Tho they from Phœbus boaſt their Heavenly birth,
We without light, dark and obſcure behold,
And Splendor's found only in burniſht Gold.
Iron unknown lay hidden without light,
By Slaves wrought from the Mine grows dazeling bright.
This to whole Troops confuſion doth afford,
Wit, which firſt fram'd, ſtoops to, the Victor Sword.
We thus of old did Nature ſearch in vain,
Our Arts did only ith' outward bark remain,
But now we her hid myſteries unfold,
And the great ſecrets of the world behold.
Better than us, herſelf can hardly tell,
What Love doth far within high Mountains dwell.
What flame firſt gives the Marble Quarry birth;
To Metals forms blind Rudiments of Earth,
And the hard child doth to perfection bring:
Why Earth ſhows her rich Treaſures in the Spring;
And ſhines, made brave with her own Native flowers.
What gentle gales, and what ſweet moiſtning ſhowers,
Do on the pregnant Goddeſs Seed beſtow;
Whilſt Heavenly Iris *mounts the Cloudy Bow.*

Why

The PREFACE.

Why Ceres *ſwells with watery Nymphs embrace,*
What Strife, what Wars ſpring from hot Bacchus *race:*
What Vulcan *doth th'* Ætnean *Fornace blow;*
What doth ſoft fires thorow all Bodies throw.
What Spirit nimbly moves the human frame:
Whence Milky juice here, there a Purple ſtream,
Watering the Body: whence the Crimſon flood;
And the quick Circulation of the blood.
What hidden fires in veins and intrals burn,
Which do the boyling Blood to Feavers turn.
What mixes freezing cold with parching heat,
And makes the different Zones together meet.
Whence comes the Peſtilence with Stygian breath,
Riding on blaſting Winds, and arm'd with death.
What Propheſying Humor through the Reins doth paſs,
What colour, and what odor in the Glaſs?
All things lye open now: He did not know
So much, to whom Prometheus *did beſtow*
His ſtollen fires: We now every part
Of the whole Earth compaſs about with Art.
He's happy who Cauſes of things can ſhew;
Sacred to Nature and to Phœbus *too;*
About his Temples Delphic *Laurels ſpread,*
And flames of lightning ne'r ſhall blaſt his head.
Whom Hermes *doth with Sacred Arts imbue,*
Whoſe Labours, Learning out of Darkneſs drew,
May all's days happy be, may he ſhine bright,
And may he ſtill enjoy Cœleſtial light:
May no Diſeaſe infect with poyſonous breath,
Him, who gains Health from Sickneſs, Life from Death.

OF FERMENTATION, OR THE Inorganical Motion OF *NATURAL BODIES.*

CHAP. I.

Of the Principles of Natural things.

THere is nothing more rarely to be met with, in the Vulgar Philoſophy, where Natural things are unfolded, with the vain figments of Forms and Qualities, than the word *Fermentation*: but among the more ſound (eſpecially of later years) who reſpect the Matter and Motion chiefly in Bodies, nothing is almoſt more uſual. But Fermentation hath its name from Ferveſcency, as Ferment from Ferviment or growing hot. The word is well known in making of Bread, and in the purgings of new Wine, Beer, and other potable Liquors: thence it is alſo applyed to other things, which are wont to ſwell or grow turgid, after the ſame manner: that at length it ſignifies, whatſoever Effervency or Turgency, that is raiſed up in a Natural Body, by particles of that Body variouſly agitated.

Bodies of a divers Conſiſtency and Habitude, are apt to a Fermenting, *viz.* either Thin or Thick, Liquid or Solid, Animate or Inanimate, Natural or Artificial; in all which is found an Heterogeneity of parts or particles, to wit, there are in them ſome ſubſtances light, and always endeavouring to fly away: and alſo there are others thick, earthy, and more fix'd, which intangle the ſubtil Particles, and detein them in their Embraces, whilſt they endeavour to fly away; from the ſtrivings, and wreſtlings of theſe two twins, in one Womb, the motion of Fermentation chiefly proceeds; but on the contrary, what things do not Ferment, for the moſt part conſiſt of like Particles, and are of the ſame Figure and Conformation, which indeed conſociat among themſelves, without any Tumult or Turgeſcency, lye quiet, and enjoy a deep peace. If Muſt, or new Wine, or new Ale or Beer, be cloſely Bottl'd up, or put into Veſſels of ſmall vent, they will grow ſo very hot, that often the Veſſels are in danger of breaking. But if the ſame Liquors, being Diſtilled by themſelves, and then what is ſeperated ſhut up, from thence no motion or heat will follow. Wherefore, Diſtilled Waters, hot Spirits, Oyls, fixed Salts of Herbs, and very many other more ſimple preparations of the Chymiſts, remain a long while

without any alteration or Fermentation, Perhaps ſome of the Particles do evaporate, but the reſt do not tumultuate. In the mean time the juice and blood of Vegetables or Animals, as alſo all Liquors Concreted, and compounded of many things, quickly Ferment, and from thence enter into divers turns of changes. The Spirit of Wine being cloſely ſhut up in a Phial ſhews no ſign of growing hot, but if but a little Oyl of Turpentine be added to this Spirit, the Particles of the Liquor will ſo leap forth, that I have ſeen it break a Glaſs Hermetically Sealed. All Diſtilled Waters of Herbs, ſo they be kept ſimply in a Glaſs, will remain incorrupt a long time, but if you add to the ſame Sugar or Syrrup, it preſently grows ſoure and is corrupted: Wherefore, that the Fermentation of Bodies may be rightly unfolded, we muſt inquire, what thoſe Particles or Subſtances are, and of what Nature of which mixt things are Compounded, and from whoſe being put together, and mutual ſtrivings, motions for the moſt part naturally proceed.

Altho there be many and divers Opinions of Philoſophers concerning the beginnings of Natural things, yet there are three chiefly deſerve our Aſſent, and Faith, before the reſt. That famous fourfold Chariot of the Peripateticks obtains the chief place, which emulous of the four wheel'd Coach of the Sun, is hurried by a quick paſſage, through the fictitious Heaven of the firſt Matter, and meaſures that vaſt and empty thing, with a perpetual reciprocation. For they ſay, all things are Conſtituted out of Water, Air, Fire, and Earth; and that out of the divers tranſpoſition of theſe, Generation and Corruption, as alſo the changes of all alterations whatſoever, do ariſe. In the ſecond place, and next, ſtands the Opinion of *Democritus* and *Epicurus*, which lately alſo hath been revived in our Age, this affirms all Natural effects to depend upon the Conflux of Atoms diverſly figured, ſo that in all Bodies, there be Particles Round, Sharp, Fourſquare, Cylindrical, Chequer'd or Streaked, or of ſome other Figure; and from the divers changes of theſe, the Subject is of this or that Figure, Work, or Efficacy. The third Opinion of the Origination of Natural Things, is introduced by Chymiſtry, which, when by an Analyſis made by Fire, it reſolves all Bodies into Particles of Spirit, Sulphur, Salt, Water, and Earth, affirms by the beſt right, that the ſame do conſiſt of theſe. Becauſe this Hypotheſis determinates Bodies into ſenſible parts, and cutts open things as it were to the life, it pleaſes us before the reſt.

As to the four Elements, and firſt Qualities from thence deduced, I muſt confeſs that this Opinion doth ſomthing help for the unfolding the Phænomena of Nature, but after ſo dark a manner, and without any peculiar reſpect to the more ſecret receſſes of Nature, it ſalves the appearances of things, that 'tis almoſt the ſame thing, to ſay an Houſe conſiſts of Wood and Stone, as a Body of four Elements. The other Opinion, which is only a piece of the *Epicurean* Philoſophy, foraſmuch as it undertakes Mechanically the unfolding of things, and accommodates Nature with Working Tools, as it were in the hand of an Artificer, and without running to Occult Qualities, Sympathy, and other refuges of ignorance, doth happily and very ingeniouſly diſintangle ſome difficult Knots of the Sciences, and dark Riddles, certainly it deſerves no light praiſe: but becauſe it rather ſuppoſes, than demonſtrates its Principles, and teaches of what Figure thoſe Elements of Bodies may be, not what they have been, and alſo induces Notions extremly ſubtil, and remote from the ſenſe, and which do not ſufficiently Quadrate with the Phænomena of Nature, when we deſcend to particulars, it pleaſes me to give my ſentence for the third Opinion beforementioned, which is of the Chymiſts, and chiefly to inſiſt upon this in the following Tract, to wit, affirming all Bodies to conſiſt of Spirit, Sulphur, Salt, Water, and Earth, and from the diverſe motion, and proportion of theſe, in mixt things, the beginnings and endings of things, and chiefly the reaſons, and varieties of Fermentation, are to be ſought. If any one ſhall object, That the Atomical, and our Spagyric Principles, are altogether ſubordinate, to wit, that theſe, tho at the laſt ſenſible, are reſolved into thoſe, only to be ſignified by Conception; I ſhall not much gainſay him, ſo it ſhews that thoſe Conceptions are real. I being dul and purblind, leave the more accurate to quick ſights, being content to be ſo wiſe as to perform the buſineſs of the outward Senſe with Reaſon: for I profeſs, it pleaſes not me, to deviſe or dream Philoſophy. But that our Work may more rightly proceed, it will be neceſſary, to ſpeak firſt a few things of theſe kind of Principles in general, and of their Affections.

I mean by the name of Principles, not simple and wholly uncompounded Entities, but such kind of Substances only, into which Physical things are resolved, as it were into parts, lastly sensible. By the intestine motion, and combination of these, Bodies are begot, and increase: by the mutual departure and dissolution of these one from another, they are altered, and perish. In the mean time, what Particles are gathered together in the subjects, or depart away from them, will appear under the form of Spirit, Sulphur, Salt, or of one of the rest.

CHAP. II.

A description of the Principles of Chymists, and the Properties and Affections of them.

1. SPirits are Substances highly subtil, and Ætherial Particles of a more Divine Breathing, which our Parent Nature hath hid in this Sublunary World, as it were the Instruments of Life and Soul, of Motion and Sense, of every thing; whilst they of their own Nature are always enlarged, and endeavouring to fly away, lest they should too soon leave their subjects, they are bound somtimes with more thick Particles, that by entring into them, and by subtilizing them, and variously unfolding them, they dispose the substance to maturity, as is to be observed in the Vegetation, and Fermentation of Bodies; somtimes being restrained within some spaces, to wit, the Vessels or Bowel of living Creatures, they are compelled more often to repeat the same measures of their motions for the performing the works of Life, Sense and Motion. From the motion of these proceed the animation of Bodies, the growth of Plants, and the ripening of Fruits, Liquors, and other preparations; they determinate the Form and Figure of every thing, prefixed as it were by Divine designation: they conserve the bonds of the mixture by their presence; and open them, by their departure, at their pleasure: they bridle the irregularities of Sulphur and Salt. The perfection and state of every thing consists in the plenty and exaltation of Spirits, and the fall and declination, in their want and defect.

As to the Subjects in which the Spirits are: Minerals becaus they are of a more fixed nature, wanting Motion and Vegetation, are almost without Spirits, or at least are contented with a few. For the birth and growth of Vegetables, they are required in a more moderate quantity. In the Constitution of a living Creature, where there is greater Use of Spirits, for Sense and Motion, a far more plentiful quantity is found. In the works of Art, and chiefly in those which ascend to perfection, by Digestion and Fermentation, there are found to be a sufficiently great proportion of Spirits: but in all subjects whatsoever, whilst the immersed Spirits are mingled with the other Principles, their condition or state comes under a threefold consideration: for they are either depressed and scattered, and so involved with more thick Particles, that they are very little seen, or shew forth their powers, as in things undigested, crude and unripe, may be perceived, in which the Spirits can hardly extricate themselves into motion, and from which they can hardly be drawn by Distillation. Or secondly, the Spirits flying forth from the thick substance of the rest, are full of vigor, shake and rightly dispose the more gross Particles, subtilize the thick, digest the crude, and bring things to the steme or height of maturity and perfection: or lastly, Spirits having obtained the height of things, do luxuriate and make excursions out of the Body: hence those that remain, are by degrees lessened of their plenty and strength, until being less in power than the Particles of the Salts and Sulphur, they are put under their yoak, and by little and little are destroyed and driven away out of the Subject; on this threefold state depends the beginnings or rudiments, the maturity and exaltation, and the defect and end of things.

It is observed, when the Spiritous Latex is drawn forth of any Liquor by Distillation, that the vapor or steam is not elevated into dew, that is, comes together in little drops or dew, every where poured forth, as it is wont to do in watery things; but

it is divided into ſtreaks, and many little rivulets, and renders the Alembic mark'd in every part, with ſtraight lines, only not meridional, leading from the Centre of the top, to the brim of the Circumference. The cauſe of which ſeems to be this, to wit, ſince that the ſpirituous ſubſtance is very ſubtil, it is not eaſily Collected into Liquor; neither is it fixed every where about the ſides of the Veſſel, in its aſcent, as watery Liquors; but always ſtretches further, and unleſs when it comes to the top it ſelf of the little head, doth in no wiſe ſtay; but there the ſpirituous breath, being reſtrained as it were in a punct, and being brought backward, it begins to gather into dew: wherefore, from that top, as it were the Fountain, the Spirits flowing forth on every ſide by ſtreams, deſcend in ſtreaks towards the mouth or brim of the Alembic. And when thoſe lines wholly diſappear, it is a ſign, that the ſpirituous ſubſtance is quite ſtill'd forth, and that the watery breath only aſcends.

2, Sulphur is a Principle of a little thicker conſiſtency than Spirit, after that, the moſt active: for when the Spirits firſt break forth from the looſned ſubſtance of the mixture, preſently the Sulphureous Particles endeavour to follow. The Temperament of every thing, as to Heat, Conſiſtency, and amiable frame or contexture, depends chiefly on Sulphur; from hence alſo for the moſt part ariſe, variety of Colours and Odors, the fairneſs and deformity of the Body, alſo the diverſity of taſtes. In the Boſom of this the Spirits immediately, in which as in a Copula, they are united, by the more hard embraces of the reſt. The ſubſtance of Sulphur, though leſs ſubtil, is yet of more fierceneſs and unrulineſs than the Spirits are, for this unleſs it be reſtrained, by the embrace of the others, as it were in bonds, and its Particles be detained one from another by the interjection or coming between of the reſt, not only leaves the ſubject, but deſtroys it ſelf, with too impetuous an eruption. Indeed the little bodies of this being gently moved, do cauſe digeſtion, and maturation, ſweetneſs, and many perfective qualities in things: being a little more ſtrongly moved, they induce heat, and an exceſs of qualities, inordinations, and chiefly a ſtinking ſavour: but being more impetuouſly moved or ſtirred up, they bring in the diſſolution of Bodies, yea a flame and Burning.

The ſubſtance of Sulphur is never ſeen ſincere, yea it conſiſts not of it ſelf from others, but vaniſhes away into Air: its Particles being concreted and chained together, with Salt and Earth, are fixed as it were immoveable, as is ſeen in Metals and ſome Stones: or being Diluted with Spirit and Water, and temper'd together with the reſt, exiſt in motion, by which means (as was before ſaid of Spirit) they are in a threefold ſtate, within the ſubſtance of the mixture: for either firſt of all its little bodies being involved with Salt and Earth, or too much drenched with a watery humidity, are obſcured, ſo that they exerciſe but little of virtue, from whence the humid and cold temper of things exiſts, their qualities are Obtuſe, Dull, and of ſmall virtue or force, and the Bodies leſs apt to be inflamed, as is diſcerned in unripe Fruit, raw Juices and green Wood. Or ſecondly, The Particles of Sulphur begin to ſhine forth with Spirit, to be more thickly heaped or rolled together, and to appear eminent above the reſt of the Principles. And ſo by its motion, they evaporate the ſuperfluous moiſture, digeſt Crudities, and induce a warm temper in things, active qualities, a lively force and maturation, or ripeneſs: which kind of exaltation of Sulphur may be obſerved in Wine and Liquors long Fermented, in ripe Fruits, in the Youth and florid Conſtitution of living Creatures. Or thirdly, The Sulphureous Particles being gathered into vigor, grow too hot, looſe the bonds of mixture, and deſire to fly away; and from their diverſe manner of departure and ſeparation, the diſſolution of Bodies variouſly happens: For either they evaporate with Water and Spirit, by degrees, and without tumult, and leave their ſubjects lean and dry, which, when the Sulphur is wholy gon, fall into Aſhes: Or ſecondly, in Bodis which abound with Sulphur, when the mixture is looſned, and the Spirits begin to fly away, the remaining Particles of Sulphur are wont to be very much moved, and to grow exceeding hot; and being ſhut up in a thick ſubſtance, are gathered together more nearly, (as in Dung and Hay growing hot) and conceive heat, and ſomtimes Burning: breaking forth after this manner, by heaps, and impetuouſly, they breath out a ſtinking ſmell, and bring on a rottenneſs to the ſubject. There is a third manner of eruption, whereby the Sulphureous Particles go forth of Bodies, when they withdraw themſelves, as it were with violence, and being gathered together, break forth into fire and flame: whereby indeed becoming unbridled and untamed, they break all bars or lets, and wholly deſtroy the ſubſtance or frame of the Subject: By this means, by their own and

proper

proper effervescency they procure a Burning, as when they being layed up wet, or the wheels of Carts, or Axeltree, made hot by motion doe fire, or becauſe Sulphur is inkindled by Sulphur: for its Particles being impetuouſly moved, ſhake or move all that's near them, and carry them into the like motion of Conflagration, as ſhall be more fully ſhown hereafter, when we ſhall diſcourſe concerning the nature of fire.

3. Salt is of a little more fixed nature, than either Spirit or Sulphur, nor ſo apt to fly away; but beſtows a Compaction and Solidity on things, and alſo weight and duration, It retards the diſſolution of Bodies, and promotes Congelations and Coagulations, and very much reſiſts Putrefaction, Corruption, and Inflammation; to wit, foraſmuch as it fixes the too volatile Sulphur and Spirit, and detains them in a Body: wherefore ponderous Woods, Stones, Metals, and what abound in Salt, are hardly enkindled, and remain a long while free from Corruption. Not only the duration of the individual, but alſo the propagation of the Species, depends very much upon the Principle of Salt, becauſe the fertility of the Earth, the growth of Plants, and eſpecially the frequent fætation, and bringing forth of young, in living Creatures, takes their Original from the Saltiſh Seed: hence it is, that *Venus* is ſaid to ariſe from the Sea, and Luſt is called Salacity. For Salt having obtained a flux, gathers together, and ſtirs up into motion, the idle, or too much disjoyned little Bodies of Spirit or Sulphur, and excellently keeps them together with itſelf, for the producing the firſt ground-work of things.

Salt within the frame of the mixture, is either altogether fixed, when its Particles being almoſt deſtitute of Spirit and Water, but bound together with Earth, or Sulphur, or both of them, grow into Stones, Metals, or Minerals of another kind; which fixity in Nature is imitated in making Glaſs, and Earthen Ware: or Salt is looſned from its fixedneſs, to wit, when its Particles being mixed with the other Principles, and chiefly with Spirit and Sulphur, and Diluted with Water do unfold themſelves, and being diffuſed through the mixture, do Ferment with the reſt: whilſt the little Bodies of the Salt are after this manner put into motion, there is obſerved of them a threefold State or Condition, to wit, of Fuſion, Volatiliſation, and Fluxation.

I call the State of Fuſion, when the little Bodies of the Salt being Commixed with the reſt, begin as to their ſmalleſt parts to be diſſolved, and diffuſed, and explicated here and there, through the whole ſubſtance of the mixture, as may be obſerved in the Germination of Plants, in the firſt Conceptions of living Creatures, and in the beginnings of Fermentations; hence Spring only a rude and indigeſted formation of things, an ingrateful ſavour, and for the moſt part bitter or biting.

From theſe firſt Rudiments of Motions, the Saline Particles aſcend by little and little, to Vigor and Volatiliſation, together with Spirit and Sulphur: to wit, whereby they run through the whole ſubſtance of the Body, and variouſly move its matter, and diſpoſe it towards maturity. Some little Bodies ſharpen, and ſtir up into Motion, others Fix, Eſtabliſh, and Congeal into a ſtony hardneſs. If there be plenty of Spirits and Sulphur, the Particles of Salt, as their handmaids, go about to unite, and aſſociate themſelves intimately with them, that they are not only ſnatched together with them, through all the receſſes of the mixture, but (the ſubject being expoſed to Diſtillation) Salt alſo aſcends in the Alembic, even as the Spirit. From the Volatiliſation of Salt, Beauty, and Fairneſs, and ſavour chiefly ſweet, happen in things, as in the florid blood of living Creatures, in ripe Fruits, as alſo in Sugar, Milk, and Hony, we know by experience.

I mean the Fluxation of Salt, when the ſaline Particles, which being firſt gathered together, with Earth, or Sulphur, or aſſociated with Spirit, and ſo remain ſeparated one from another, afterwards the bond of the mixtion being looſened, they become wholy free, and unlooſened from the yoak of the reſt: for ſo they flow together, explicate themſelves through the whole frame of the ſubject, and whilſt Spirit and Sulphur for the moſt part fly away, theſe exerciſe a dominion over the remainder, and induce a ſoureneſs into the whole mixture: by reaſon of this Fluxation of Salt, Wine, Milk, Blood, and Eateable Things, at firſt grateful and ſweet, grow ingratefully ſoure when they begin to Corrupt; and for this Reaſon, all Salts whatſoever, having gotten a Flux, by a violent Diſtillation by Fire (that is, being driven from the Combination of Earth) grow ſour, than if the ſame ſour Liquor, be put upon the inſipid dead Head, the Whole laſtly becomes ſalted.

Salt

Salt being deprived of the Company of the reſt, (except the Earth) becomes at laſt fixed, as is obſerved in Sea-Salt, or the incineration made of Herbs, whoſe Particles ſo cleave together, that they cannot be pulled aſunder by the ſtrongeſt Fire. When Vegetables are Diſtilled, ſome Saline Particles, though but few, made fit for Fuſion, aſcend with the reſt; and from thence ſome Diſtilled Waters retain a genuine ſavour of the mixture: The parts of living Creatures being expoſed to Diſtillation, yield a Volatile Salt: when Minerals, or ponderous Woods full of Salt, are brought under by Chymiſtry, the Diſtilled Liquor is like to Salt that hath gotten a Flux, and is very ſour.

Spirit and Sulphur eaſily unlock the ſubſtance of the mixture, and make way for themſelves; but Salt cannot, unleſs it be ſnatched forth of doors together with the Spirit it ſelf. As Spirit and Sulphur being outwardly applyed, in diſſolving or burning a Body, open as it were the doors for their Companions ſhut within, ſo alſo, Salt Liquors Diſtilled, do the ſame thing. For Stygian Waters ſtrongly Corrode Metals, and are ſeen like a flame put to them, to burn and conſume the ſame.

Salt reſiſts Inflammation, for that it detains the Sulphureous Particles in its Boſom, and hinders them from breaking forth. But excepting that Sal Nitre encreaſes the burning of Sulphur, which indeed happens by accident, becauſe that Salt, as it were an Hermaphrodite, grows very turgid with Sulphureous Particles alſo, combined in the mixture; wherefore, when the Salt is melted by other fired Sulphur, the ſhut up Sulphur, breaks forth with violence, and (like a blaſt from a Bellows) ſhakes the inkindled fire round about, and drives more impetuouſly the ſubject into a Body: In the mean time, if yout put the flame to Nitre, it will not be inkindled at all; but being put to a Sulphureous Body, it promotes its enkindling; but the other Salts, leſs turgid with Sulphureous Particles, or rather deſtitute of them, being mixed with Sulphur, hinder its inkindling, and ſomtimes put it out.

So much for the Active Principles, which effect, as it were, the firſt ground-work of Bodies: thoſe which follow, chiefly beſtow on them Conſiſtency and Subſtance. For from hence exiſt either Liquids or Solids, Small things or Great. For Water and Earth, fill the little ſpaces that are empty, through the Combination of the reſt, with their coming between, and amplifie and enlarge the lineaments of the Body, otherwiſe too ſhort and contracted.

4. Water is the chiefeſt Vehicle of Spirit and Sulphur, by whoſe intervention they conſociate one with another, and with Salt; for the other Principles, being diſſolved by a watery humor, or at leaſt diluted, continue in motion, without which they grow ſtiff, as congealed things.

When Water is wanting, the active Principles meet together too ſtrictly, and mutually rub againſt, and conſume themſelves; and when for this reaſon, the ſuppliment of food is cut off, the Body grows withered. If humidity abounds too much, theſe Elements are eſtranged or diſſociated too much one from the other, wherefore the ſubject becomes ſluggiſh and ſlow, and of leſs efficacy, and unapt for motion. Beſides, Bodies too moiſt, are lyable very much to rottenneſs and Corruption; becauſe from too much Humidity the Combination of Spirit, and Sulphur, and Salt, is too looſely effected; that they do not mutually embrace one another, nor are retained with their embracement, in the ſubject. Indeed Water abounding eaſily evaporates, and then the frame of the mixture being looſened, and the doors ſet open, Spirit and Sulphur eaſily break forth, the way being made, and leave the ſubject, as it were vapid, or made ſharp with Salt: for from hence, the infuſions of Vegitables, Decoctions, Juices of Herbs, and all Liquid preparations, if the quantity of Water be greater than the reſt of the Principles, and improportionate, quickly Corrupt.

Water is moſt eaſily drawn forth out of every thing by Diſtillation, for when Spirit and Sulphur are often intangled with nets of Salt or Earth, they hardly let go their embraces, and are not obedient but to a more intenſe heat, and often times require a previous Putrefaction. Water moſt eaſily, and often with no labour, is driven out of every Body. But moſt often it ſnatches in its flying away, ſome more looſe Particles of Spirit and Sulphur, and carries them with itſelf, forth of doors.

5. As the interjection of Water in Liquids, ſo of Earth in Solids, fills the empty little Spaces and Vacuities, left by the other Principles. For theſe, hinder the active Principles from a too ſtreight embrace, whereby they ſhould rub againſt themſelves, and cleave one to another; alſo by its thickneſs, it retains

too

too Volatile things: besides, it inlarges the due substance, and magnitude in Bodies.

The more that Earth abounds in any thing, it is so much the less active, but of longer duration: hence Minerals endure a long while, then next the greater Trees; in the mean time Animals, and the more slender Plants, are but of short age.

In Distillations, Earth ascends the Alembic, almost not at all, or but in a very little quantity: for the most part it is left, with a portion of Salt, for a *Caput Mortuum* or Dead Head; therefore it is called *Terra Damnata*, or damned Earth: because, when the other Principles are freed, the Prison being as it were broken, this is still detained: besides, Earth being deprived of the Company of the rest, is of no Use, nor capable of change, or exaltation.

Thus much for the Elements or Principles of Natural things, considered apart, and by themselves. It follows, that some of their Affinities and Conjugations be unfolded: because these very strictly cohere with those, and very hardly or not at all are joyned with others. Out of the mutual Combination of some, and disagreement of others, various Affections arise, the knowledg of which gives no little Light to the Doctrine of Fermentation.

There is a certain Kindred and Similitude of parts, between Spirit and Sulphur, which are agil or light, and easily to be dissipated in both; wherefore, Spirit being driven forth of the Body, draws abundantly with it Sulphureous Particles, as is discerned in Spirituous Liquors Distilled out of any thing; to some of which if you mingle Water, the Liquor appears as it were troubled with precipitated Sulphur; but the Spirit without the Sulphur is undiscernably mixed with the Water, which however by reason of is Volatility, may be also easily drawn away and separated by Distillation.

Altho Spirit and Sulphur are Principles very resembling, and (because of a ready motion) either are inflameable, yet they are not one and the same, as is asserted by some: For Sulphur Copiously subsists in Bodies almost destitute of Spirit, to wit, in common Sulphur, Antimony, and other Minerals; in which its Particles are very fixed, and of their own nature almost immoveable, which is very far from the Nature of Spirits: For they abounding in any mixture, never lye idle, and always in motion, bring various alterations to the Subject where they dwell; then if they abound in strength, they easily and without tumult carry themselves forth of doors of their own accord. But Sulphur, altho it abound, doth not easily evaporate, but hath need of a strong heat, or an actual fire, that may make a way for it; and lastly, it breaks forth, not without a stink or burning: yea, if you endeavour to Distil Oyly and Fat things, although very Sulphureous, with a moderate Fire, they are wont to yield a Liquor only Waterish, and not inflameable; but if we provoke generous Wine, which swells with Spirit, by the gentle heat of a Bath, a most burning Water will Still forth, and apt wholly to be inflamed.

Spirit is not presently joyned with Salt: For Sugar and Salts are scarcely dissolved, by the rectified Spirit of Wine, but are after a manner associated by a long digestion and circulation; as is perceived in the Volatile Salt of Animals, or Tincture drawn forth from the Salts of Herbs, or of Minerals, by the Spirit of Wine. If that Spirits excel in plenty, and virtue, they assume to themselves, and Volatilise the Saline Particles. And therefore the Salt contained in the Juice or Blood of Animals, being associated with Spirit is volatilised: also the Spirit of Wine, being Distilled by many Cohalations, with the fixed Salt of Herbs, renders it Volatile, and makes it pass through the Alembic; but if the power of the Salt be greater, it tames the Spirit and fixes it. Hence the blood, being become Salt, by means of an ill dyet, becomes less Spirituous. Fixed Salts, and the Oyl of Vitriol fix the Spirits, grown too volatile, and unbridled; and Coagulate the Spirit of Wine it self.

But Sulphur is a more fit subject of the Spirit, by the coming between of which it easily is united with Salt and the other Principles; and as Spirit best agrees with Sulphur and Water, so Sulphur intimately cleaves to Earth and Salt.

As to Sulphur, besides its affinity with Spirit, it hath a great relation with Salt it self, to the volatilisation of which it doth not a little help: wherefore in Bodies which abound with a volatile Salt, there is found plenty of Sulphur, as in Amber, Soot, Hornes and Bones, as also in the excrements of living Creatures; where Salt and Sulphur are in motion, and evaporate from the subject, a very stinking smell is sent forth;

forth; for Sulphur being ſharpned with Salt, pricks more ſtrongly the ſenſory, and ſtrikes it with its ſharpneſs; in the mean time, Sulphur exhaling with Spirit, both pleaſes the ſenſe, and excites a very pleaſant Smell.

Sulphur is as it were diſtracted between Spirit and Salt, and adheres at once to both parties. In the Diſtillation of Amber, Turpentine, Harts-Horn, and the like, a certain leſſer part of Sulphur, being united to Spirit, firſt aſcends, and cauſes a Yellow Oyl, or clear Liquor of a grateful ſmell: the other part of Sulphur, being joyned to the Salt, is driven forth in the ſecond place, and is Diſtilled with a moſt ſtinking ſmell, in the form of a red or black Oyl: In like manner, in the Circulation of the blood, a pure and delicate portion of Sulphur, being mixed with the Spirit, ſupplies both the Animal and Vital Spirit with matter; the other more thick part, being Boyled and Roſted with Salt, is layd up in the Choledock Veſſels (or belonging to Choler) as it were a certain excrement ſeparated from the blood. As Spirit does not eaſily Cohere with Salt, ſo Sulphur does not with Water: wherefore Fat and Oyly things, as alſo Gumms and Sulphureous Reſines, either ſwim upon the Water, or ſink down to its bottom. But Sulphureous things, Salt coming between, are commixed with a Watery Liquor, as we ſee Oyls imbued with Sugar or Salt, to be diſſolved in common Water, which otherwiſe would flow ſeparate.

Sulphur is not ſo tractable in Diſtillation, as Spirit, Water, or Salt: for the Particles of this, being very Viſcous, ſtick together among themſelves, and alſo to others, that they cannot eaſily be pulled from their embrace. Hence among Sulphureous things, there are ſome, which are not forced, but by a ſtrong and burning heat, into a ſtinking Oyl, and very empyreumatick, or ſmelling of Fire: but others, more pertinaciouſly cleaving together, are not to be looſened by Diſtillation, but are only broken into integral parts; and ſo aſcend under the form of a dry Breath, as common Sulphur, Benzoin, Camphor, and the like.

Salt, beſides its affinity with Sulphur, is alſo moſt ſtrictly united with Earth; wherefore Stones, and the more hard Minerals, conſiſt chiefly of Salt and Earth. The Acid Spirits of Minerals, (which are only Salts reſolved into Liquor by Diſtillation) if at laſt they be poured on the *Caput Mortuum*, Cohere with a ſtrict embrace to it, that there will be need of a moſt ſtrong Fire, to drive them forth again. Alſo in Glaſs, the union of Salt and Earth is ſo ſtrictly made, that it will not ſuffer a Divorce by any means. Salt alſo is moſt eaſily diſſolved in Water; and it melts of its own accord, in a moiſt Air: and theſe are as eaſily ſeparated one from another.

By reaſon of theſe Combinations, theſe Principles have got various Appellations, and not Congruous in their own Nature to themſelves. For Sulphur, for as much as it is Aſſociated with Spirit, is called pure and ſweet; when with Salt, impure and ſtinking, for as much as with Salt and Earth, it is called thick and Earthly; when the Spirit aſſumes to it ſelf Sulphureous Particles in a moderate quantity, it is ſeen to be ſweet; when ſaline, ſharp; when both, bitter. Salt has a diverſe diſpoſition, and is known by many names, by reaſon of its various mixture with the other Elements, and chiefly with Earth: for beſides the Titles of Fluid, Fixed, Volatile, for this reaſon it is termed Marine, Aluminous, Nitrous, Vitriolick, Armoniack, or of ſome other kind. By ſome, theſe kind of Conjugations are eſteemed, but wrongfully, as ſo many divers Principles, when they are but more ſimple mixtures, by the coming together of the firſt Elements, and being looſened by Diſtillation they openly ſhew their Race, from whence they are. For all Salts whatſoever being driven into a Flux by the Fire, ſhew Liquors very near of Kin one to another, to wit, Acetous: by the like means Spirit and Sulphur are compelled to put off their Masks, and to reſume the Native Species common to each.

And ſo much for the Principles of Natural Things, and of their Affections and Conjunctions. It is abundantly manifeſt, that theſe kind of Subſtances are in every Body, (beſides the Analyſes of Bodies Chymically inſtituted) alſo from the Mutations, and effects of Things, which happen of their own Nature. When Muſt is Ripened into Wine, is not Spirit, a Sulphureous part, alſo Salt, and Earth Conſpicuous to our Taſt and Eyes, beſides the watery Liquor? Alſo the Juice of every Plant being exalted by Digeſtion, exhibits the ſame ſincere, and as it were diſtinct: what is greater, things ſubject to the Flame, when they ſeem to be burnt, and reduced almoſt to nothing, they go into theſe kind of Particles; beſides the Salt remaining in the Aſhes, the Smoke and Flame grow together into Soot, as it were a Meteor, in which

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are comprehended together, Spirit, Sulphur, Salt, Water, and Earth, as it were in a certain compendium of the mixture. For the active Principles abound in Soot, more than in any other inanimate Body.

But becauſe with ſome there hath ſpread a certain ſuſpicion, that thoſe our Principiples, chiefly the Saline and Sulphureous, are to be produced for the moſt part by Fire, and are no ways to be found in mixt things, unleſs after the coming between of that: I will witneſs to you in ſome inſtances, that the thing is plainly otherwiſe. Concerning the firſt, It is commonly known, that the Aſhes of every Plant, being once Elixivated, or made into a Lye, if it be afterwards Calcined, will not yield any thing of Salt; beſides if Concretes being Diſtilled, Exhale or Breath forth a very ſharp or acid Liquor, their Calx is not ſaltiſh; and on the contrary when the Salt being Volatilized or brought to a Flux, aſcends the Alembic, you ſhall ſeek for it in vain in the dead head. To prove the exiſtency of the Sulphureous Principle in Vegetables, take Guaiacum, or a piece of any other ponderous Wood, and being put into a Glaſs Retort, draw it forth by degrees; it ſhall exhibit, together with an Acid Liquor (which water is ſaltiſh) in great quantity, a blackiſh Oyl (which part of it is Sulphureous.) It appears from hence that this was in the Body before the Diſtilling, and in no wiſe produced by its Operation, becauſe if you proceed after another manner, that the Sulphur may be taken out of the Concrete before Diſtillation, the Liquor that comes forth will be almoſt wholy deprived of its Oylineſs: Wherefore, if you pour Spirit of Wine to thoſe Chips of Wood, it will Extract in a great quantity, by this Menſtruum, a pure Reſine, which is the Sulphureous part it ſelf: then if you Diſtil (as before) in a Retort, the remaining Chips being waſhed in common Water and dryed, you will have a very little Oyl only. What is more to be admired, and confirms alſo more fully the truth of this kind of Origination, ſome Bodies, which being almoſt deſtitute of Spirit and Sulphur (becauſe chiefly Volatile) conſiſt chiefly of Salt, Earth and Water, are ſeparated into theſe Elements by Diſtillation: the ſame mixture in number, and wholy known by the ſame accidents, is reſtored to them, being mingled together again; for example, if you Diſtil Vitriol in a Reverberating Furnace, you ſhall have a Phlegm almoſt inſipid, or a Watery part, then a Liquor very ſour, or a Salt having gotten a Flux, and in the bottom, a Red Earth, and finely Purpled: this being rightly performed, if the two Diſtilled Liquors be poured to the dead head, you ſhall have the ſame Vitriol, as you had before, and again revived, in the ſame Colour, taſt, yea and almoſt in weight. In like manner you may proceed, with the ſame ſucceſs, with Nitre, Sea-Salt, Salt of Tartar, and perhaps with Alum and other Minerals: So that thoſe Concretes, which conſiſt of fixed, and ſtable Elements, may like a Mechanick Engine be pulled into pieces, and preſently without hurting the Machine, be reſtored or made whole. But there is enough ſpoken concerning the Principles of Natural Bodies. Theſe being thus premiſed, we will proceed to the thing propoſed in the beginning, to wit, the Doctrine of Fermentation.

Chap. III.

What Fermentation is: Its Diviſion as to the Subjects, and firſt of Minerals.

FErmentation is an inteſtine motion of Particles, or the principles of every Body, either tending to the perfection of the ſame Body, or becauſe of its change into another. For the Elementary Particles being ſtirred up into motion, either of their own accord or Nature, or occaſionally, do wonderful more themſelves, and are moved; do lay hold of and obvolve one another: the ſubtil and more active, unfold themſelves on every ſide, and endeavour to fly away; which notwithſtanding being intangled, by others more thick, are deteined in their flying away.

away. Again, the more thick themſelves, are very much brought under, by the endeavour and Expanſion of the more Subtil, and are attenuated, until each of them being brought to their height and exaltations, they either frame the due perfection in the ſubject, or compleat the alterations and mutations deſigned by Nature.

Fermentation is an action or motion meerly Natural, and what doth perform it, are only Particles Naturally implanted in the Concrete; yet as to the ſubjects in which they are found, it is wont to be variouſly diſtinguiſhed. And either things of Nature are ſaid to Ferment in a threefold Family, of Minerals, Vegetables and Animals; or the Works of Art, to wit, when Actives are applied to Paſſives by an outward Agent. Though the Term and conſideration of Fermentation, are chiefly due to Artificial things, and things made by Hand; yet it will not be from the purpoſe, to ſpeak firſt ſomthing of Natural Things, that a Compariſon being made of either, the Truth of our Hypotheſis, and the certainty of the Principles may be confirmed. But this only lightly and by the way, in this place I ſhall paſs over, becauſe their more full handling belongs to Phyſiology, or the Diſcourſe of Natural or Phyſical Things.

In the firſt place, as to Minerals, altho in the Bowels of the Earth, the Fermentation is leſs conſpicuous than in the Superficies, yet it eaſily appears that the Elementary Particles, or the Fermentative Principles, are included in the depth of the Earth, as in a certain pregnant Womb: which there conſtitute Concretes, and things gathered together, by ſtrict Embraces, the Productions of Minerals; but being looſned, and moved in the Boſom of the Earth, or exhaled upwards, cauſe the appearances of Meteors.

Firſt, The Generation of the more hard Minerals, induces rather Congelation than Fermentation; becauſe indeed theſe Principles, growing together in every Subject, are ſo fixed, and as it were bound together in Bonds, that they are not able any ways to move themſelves, or to depart one from another. This kind of Fixation chiefly depends on the plenty and greater proportion of Salt and Earth, (ſomtimes with an addition of Sulphur) than there is of Spirit or Water, To wit, Salt and Earth, being moſt ſmally broken, and reſolved even into a Vapour, lay hold of one another, and ſtiffen into a hard matter, and at laſt not to be looſned; almoſt after the ſame manner as making of Glaſs, and the burning of Bricks and Earthen Ware, are performed. For Glaſs conſiſts of Salt and Earth, which when being broken into moſt ſmall bits by a very intenſe Fire, they ſuffer a Flux, they mutually lay hold of one another, and ſo ſtrictly and intimately come together, that they are never to be parted. Glaſs is more fragil, or eaſie to be broken, than Earthen Pots, or Minerals, becauſe it has a greater plenty of Salt, than of Earth, which is more plentiful in Earthen Ware, and in Minerals: To ſome of which, alſo happens a modicum of Sulphur, and for that reaſon they are more tenacious and ductil; as is to be obſerved in Metals, when in the mean time ſtones, and what contain little of Sulphur, are fragil, and apt by every ſtroke, to fly to pieces. In Vitrification there is need of a violent Fire, for the fuſion of the Salt and the Earth, (whoſe Particles, as is commonly ſaid, are the Peſtles of the Chymiſts) but within the Bowels of the Earth, there is not required ſuch a fuſion by Fire, for the Concretion of Minerals, becauſe Salt and Sulphur exiſt, being naturally reſolved into moſt ſimple Particles; which, when they lay hold on the Earth, eaſily ſtiffen into Metal, or into a ſtony hardneſs. There are ſome Fountains found out, which, for that they flow with a Primitive Salt, and reſolved into ſmall Particles, what ever Bodies are immerſed therein, they cauſe them preſently to become ſtony. We have read alſo, of Men changed into Stones, yea a whole City to have been ſtiffned into a ſtony ſubſtance, by the Air, or by ſome Vapour brought forth of the Earth: The Faith of which thing is left to the Authors.

Meteors are made out of the ſame Principles by which Minerals are made, and conceived almoſt in the ſame Womb: but looſned from Concretion wandring here and there, and diverſly fluctuating: or which being included in Subterraneous Vaults, and there moved, produce divers Springings up of Fountains, or ebullitions of hot Vapours; or exhaling from the Dens of the Earth, and being mixed with Airy little Bodies, they cauſe within the Region of the Atmo-Sphear, as it were a diverſe faſhioned Landskip, of Clouds, Winds, and the appearances of other things, in the Superficies of the Earth, or on high: in either there are highly active Principles, chiefly Salt and Sulphur. Spirits are either deficient in Meteors, even as in Minerals, or are found only in a very ſmall quantity or proportion: to wit, they are almoſt wholly excluded from theſe, by reaſon of the ſtrict frame of the Subject, which doth

doth not eaſily yield ſpace, and paſſage for their motion; alſo they abſtain from thoſe (*viz.* Meteors) by reaſon of the lax, and wholly looſe ſtructure of Matter, from whence they, who are mighty in ſwiftneſs, eaſily break forth, and deſire to fly away.

Within the Boſome of the Earth, the Saline Particles being looſned, even into a Vapour, and then kneaded with an Earthy Matter or the moiſtning of Waters, they cauſe Eruptions of Fountains, and Acidulous or Spaw Waters, which reſemble the diſpoſition of Vitriol, Alum, Nitre, ſomtimes of Iron or Copper. Alſo the Sulphureous little Bodies being looſned, and gathered together, inkindle an Heat, and ſomtimes Subterraneous Fires; by whoſe Breaths the Dens and Caverns being made Hot, like an Hot-Houſe, whilſt the Watery humors paſs through them, they from thence conceive their Heat, and ſupply the Springs of Hot Fountains for Bathes.

In like manner, in this viſible and Etherial world, Vapours both Sulphureous and Saline, and of a diverſe Kind and Nature, perpetually breath forth, and are diffuſed through the whole Region of Air. From hence the diverſity of winds, the viciſſitudes of Cold and Heat, Rain, Snow, Hail, Dew, and Hoar Froſt, and what are of this Nature, have their Origine. Concerning the particular inſtances of theſe, the famous *Gaſſendus* may be conſulted, who in his *Epicurean* Philoſophy, moſt aptly deduces the Phænomena, almoſt of all Meteors, and the reaſons of them, from the Exhalations of Sulphur, and Salts, either Nitrous, Vitriolick, Aluminous or Armoniack.

Chap. IV.

Of Fermentation for as much as is obſerved in Vegetables.

IN Vegetables, Fermentation is yet more plainly diſcerned: for whilſt they Bud forth, Grow, Flower, bear Fruit, Ripen, Decline and Dye, we may obſerve the divers motions of Particles or Principles, their various Habits and Tempers. I intend not here to deſcribe the ſeveral ways and proceedings of theſe. It will be ſufficient, for the unfolding the Doctrine of Fermentation, to take notice of ſome chief inſtances, concerning this Subject.

It is manifeſt, by dayly Experience, that all Plants whatſoever, expoſed to a Spagyrical or Chymichal Operation, may with little labour, be reſolved into the aforeſaid five-fold Elements: But in ſome there is found a greater plenty of Salt, in others of Sulphur; in ſome Spirits abound: Water, and Earth, are in moſt proportionated, according to the Bulk and magnitude of the thing. Plants in which Salt abounds, with a mean of Sulphur, and a little quantity of Spirits, are for the moſt part of long Age, ſomwhat big, or flouriſh all the Winter, or tho their Leaves fall, they keep a Nutricious Juice under the Bark. Of which ſort are the Oak, Aſh, Elm, Box-Tree, and all ponderous Woods and Shrubs.

In ſome Sulphur abounds, with a little Salt and Spirit, as are the Pine, the Firr-Tree, Cyprus Tree, Juniper, Ivy, Olive, Cedar, and Myrtle Trees, and all reſinous Plants; which, for the moſt part have a ſweet ſmell, and are perpetually Green, by reaſon the juice, wherewith they are nouriſhed, is viſcous, and not eaſily to be diſſipated. In others, beſides plenty of Salt, and Sulphur, Spirits alſo are found, in a greater proportion, as are Fruit-bearing Trees, and eſpecially the Vine, from whoſe Fruit the Juice being wrung out, and purified by Fermentation, grows very big with Spirit. Of this rank are Plants for the moſt part Medicinal, alſo ſuch as produce Curious, and Odoriferous Flowers, But in ſome Water and Earth luxuriat in too great a quantity above the other Elements, as in cold Plants, and ſuch as grow in too rank a Soil.

The Germination of Plants happens after this manner, either it is made out of the Seed, Root, Trunk, or of its own Nature, from the naked matrix of the Earth. First, the Spirit being shut up within, by the Ambient Heat and Moisture loosening the frame of the mixture, being loosned, it presently endeavours to fly away: But being held back in its flight, by the more thick Particles of the rest, stretches forth more largely its Den, and together with the other Principles, with which it is bound, thrusts forth on every side, into length and breadth: even as a little bundle of Silk, being contracted into wrincles and folds, is opened here and there: In the mean time, the little Spaces left by the enlargement of the Spirit, and as it were made hollow, are filled up by the next Matter, driven even into the Vacuities. And after this manner the Architect Spirit, with his Ministers, Salt and Sulphur, still stretching forth it self, like a Snail, frames for it self an House, whose Inhabitant it is, and by dilating it self, stretches forth that, until at last it hath wrought the Plant into the due Bulk and Figure designed by Nature.

You may take notice, that the times of the year, for the Budding, Flowring, Ripening, and decaying of Vegetables, are of great Efficacy and Virtue: All the Winter, the Womb of the Earth, as it were shut up, is almost barren: for the Spirituous Particles, which are wont to actuate the rest, and as it were to lead the dance of Natural Motions, are either chased away by the Winters Cold, or being Congealed in their Subjects, are fixed: Wherefore at this time Germination and Vegetation are very rare, unless that some irregular Plants, which are composed of plenty of Spirit, Salt, and Sulphur, dare to break forth. But in the Spring, when the bowels of the Earth begin to be a little warm, by the Vicinity of the Sun, presently they are impregnated with a wonderful Fecundity, and produce the effects of their Seminality. Not only the Superficies of the Earth, but also the Water and Air, every where, grow big with Spirituous Particles; which as it were raise up from the Dead, the little Bodies of Salt, and Sulphur, and bring them into Motion: Therefore, besides that the Plants Bud, the Juice and Blood of living Creatures is quicker and more apt to abound. At this time the Birds and Fishes build their Nests, and bring forth Eggs: also we may perceive in our selves the Blood to flow high in the Vessels, and usually to Ferment too much. For all things are then full of this Ætherial Substance, and the whole Bulk of Nature, as it were inspired by a lively Fermentation, is abundantly fruitful of Motions and Generations. Yea, these our Principles, at first separated and dispersed one from another, led as it were by an Appetite of Copulation, enter into mutual Marriages, and being Married together, almost with infinit Embraces, cause a most ample Seeding, and Germination of the Herby State.

At the beginning of the Summer, (and perhaps in some sooner in some later) when sufficient time hath been granted for the Stature and Magnitude of every Plant, and that it is now come to the highth of increase; it behoves Nature to perfect her Work, and to cook and ripen the Substance, as yet rude and undigested: Wherefore the active Principles leisurely extricate themselves from the more thick, and creep forward towards the top, there being placed with a mutual increase, they are formed into Flowers and Blossoms, from which at length (for that they are of a soft and light texture) Spirit and Sulphur easily evaporate, and the frame of the mixture quickly decays. But Nature careful of the perpetuating every thing, when it cannot keep for ever the individuum, is so provident, that the Species may not wholly perish: Wherefore she institutes new and more firm and lasting Combinations of Spirit, Salt and Sulphur. For she selects from the whole Substance of the Plant, the more noble and highly active Particles, and these being gathered together, with a little Earth and Water, she forms in the Seed, as it were the quintessences of every Plant; in the mean time the Trunk, Leaves, Stalks, and the other Members of the Plant, being almost quite deprived of the active Principles, are much depauperated, and are of less Efficacy and Virtue.

About Autumn, after the Seeds are framed, (as it were pledges left in memory of the Plant) the Particles of Spirits, Salt and Sulphur, which remain, being now placed in their Strength or Exaltation, endeavour a Dissolution, and Departing one from another. And first of all, the Spirits evaporate by degrees with the Watery humour, through the Doors set open by the Summer Sun, with which the more pure parts of the Sulphur, make also their Journey: in the mean time the Salt being fixed with the Earth, and more thick Sulphur, is left behind: Wherefore in most the Leaves fall at this time, and in those of a tender and light Constitution, the Principles are wholly

wholly diſſipated, and the Trunk and Stalk, together with the Root, wholly die. In ſome, after the falling of the Seed, with the Leaves, the Stalks wither; in the mean time the Principles, which may renew the Plant in the next Spring, are preſerved in the Root.

Alſo Winter coming on, the face of things is wholly changed; and the Elements, which in the Spring did affect to be Joyned and to Marry one with another, ſeek nothing more than Divorces. The Spirits fly away from very many things, and wander in the Air; in the mean time the Particles of Salt and Sulphur lie as it were benummed and aſleep. Not only the Bodies of Vegetables, but of very many Animals, are left as it were dead all the Winter, till they are raiſed again to life by the Spirit, returning with the Vernal Sun, and as it were animated anew. But this little Branch being made concerning the Vegetation of Plants, it is now fit that we proceed on our Journey to Fermentation, by the Rule of our before eſtabliſhed Method, to what is to be obſerved, concerning the parts, and humours of Living Creatures.

Chap. V.

Of things to be Obſerved of Fermentation about Animals.

IT is ſo certain that the Bodies of Animals, conſiſt of the aforeſaid Principles, that it wants no proof. For they ſo plentifully ſwell up, with Spirit, Salt and Sulphur, that their Particles are obvious to the ſenſe: Wherefore they are moved with a more ſwift motion, and more excellent ſenſes of Life, and Functions of Heat, in the Subjects, in which they are implanted, are inlarged. It would be too much labour, and tedious, here to deſcribe, the ſeveral manners and proceſſes of Fermentations. The firſt beginnings of Life proceed from the Spirit Fermenting in the Heart, as it were in a certain little punct. The motion of this, is not as in Vegetables, ſlow and inſenſible, and only to be known by their increaſing; but preſently becoming rapid, is conſpicuous to the Eyes: becauſe the Spirit leaping from the Punct, as from a Priſon, being ſtirred, and having obtained the Vehicle of Blood, ſwiftly runs forth; and leaping forth, it cannot wholy fly away, it makes hollow ſpaces for it ſelf in the thick ſubſtance, in which it is included, for its excurſion, being compelled ſome other way backward. Laſtly being returned to the Heart, it Ferments the more, wherefore it ſtretches forth further the ſpaces of its Excurſion, and ſo eaſily makes an hollow way for its return back; and after this manner, for the carrying about the Blood, Arteries and Veins, as Channels and Rivulets are framed through all the parts of the Body: and on ſuch a Viciſſitude of Motion, or Reciprocation, depends the life of living Creatures, which, that Nature might preſerve a long while, ſhe placed the Ferment in the Heart, by whoſe inſtinct, or endeavour, the Blood grows impetuouſly Hot, and as it were inkindled into a Flame by its Deflagration, diffuſes the *effluvia* of its Heat round about on every ſide: for by the Fermentation, or Accenſion which the Blood ſuffers in the Boſome of the Heart, very many Particles of Spirit, Salt and Sulphur, endeavour to break forth from its looſened frame: by which being much rarified, and like Water boyling over a Fire, the moved and boyling Blood is carried through the Veſſels, not without great Tumult and Turgeſcency. We would ſpeak more in this place, both of the Natural Fermentation of the Blood, and the Feaveriſh, but that we reſerve this Conſideration for a peculiar Tract, where we Treat of Feavers.

Beſides this Ferment conſtituted in the Chimny of the Heart, upon which the motion and heat of the Blood very much depends, there are others laid up every where in the Bowels, of a diverſe diſpoſition, by the help of which, both the Chyle (which is the Rudiment or Beginning of the Blood) and the Animal Spirits, its Quinteſſence, are truly framed. There are others alſo which ſerve for the perfecting the Blood, tranſmuting it into other Liquors, and freeing it from Excrementitious Matter: It will be

be too far from our propoſed method, to wander, to inſiſt upon each of theſe, and to reap anothers Harveſt: Wherefore I will only add in this place, ſome ſelect inſtances, which may illuſtrate the Doctrine of Fermentation.

It is commonly received, that the Concoction of the Chyle, in the Ventricle, is made by the means of a certain Acid Ferment: That ſuch a thing is the Acid belching in a full Stomach, and the want of it in the loſs of Stomach, in Feaveriſh and Dyſenterical people do teſtifie, *&c.* and its reſtitution a ſign of Health: to which may be added this Obſervation; Chalybeat Medicines being taken at the Mouth, a little after excite a Sulfureous ſavour in the Throat, as if hard roſted Eggs had been eaten: which ſeems wholly to be made by the Acid Ferment of the Ventricle, gnawing the Iron, even as Spirit of Vitriol, being ſprinkled upon the fileings of Steel, excites ſuch a ſtinking and Sulphureous Odor. Some ſay this Ferment is breathed into the Stomach from the Spleen, but by what means that may be done doth not yet appear by Anatomical Obſervation. It ſeems not improbable that this Ferment is implanted in the Ventricle, that it is only made by ſome remains of the perfected Chyle, which fixed in the folds of the Ventricle. and there growing ſowr, puts on the Nature of Ferment; even as a portion of Dough being fermented or levened, and and kept to a ſowrneſs, becomes a convenient Ferment or Leven, for the making of Bread. In like manner this kind of Acid humour being prepared from the Aliments, and long carried in the Ventricle, promotes the Concoction, and ſubaction or ſubduing of the Food. For Acid things, which are full of Salt, carried out to a Flux, excellently conduce both to the Fermenting and Diſſolving of Bodies: Wherefore by the action of this, Salt and Sulphur, with which eatable things very much abound, are broken in the Ventricle, and are reduced into very ſmall parts. The Chyle being after this manner Fermented, acquires a Milky colour, by reaſon that the Sulphureous Particles are diſſolved together with the Saline, and mixed with the Acid Ferment. For if you pour an Acetous humour to any Liquor impregnated with Sulphur and volatile Salt, it preſently grows white like Milk; as may be diſcerned in the preparing the Milk of Sulphur, or the Reſinous extracts of Vegetables. Yea, the Spirits of Harts Horn, or Soot, being very full of Volatile Salt, if they be poured to any Acid Liquor, or ſimple Water, acquire a Milky colour.

Concerning this Ferment hid in the folds of the Ventricle, it is obſerved that it is after various manners, and changes the Aliments by a diverſe means: for tho in a ſound Conſtitution it is indifferently Acid, and chiefly owes its force and energie to the Salt being brought to a Flux; yet it often declines from this laudable condition, and conteins in it ſelf either too much of ſowrneſs, or leſs than it ought to have: In the former Caſe, where the Salt hath got too ſowr a Dominion, all things taken in, (the Saline Particles being carried forth to a Flux, and the reſt unduly brought under) preſently grow ſour: as moſt often happens in Hypochondriack Diſtempers: on the other ſide, where the Volatile Principles obtain the firſt place, (Fermentation being too haſtily made) the Sulphureous parts of the Chyle are ſuddenly, and as it were forceably exalted; and the unconcocted of the Saline, paſs into Choler: which ordinarily happens to thoſe abounding with bitter Choler. They therefore who have the Ventricle affected after this latter manner, Sweet and Fat meats being eaten, they are troubled with a bitter and bilious Taſte: Again, they who ſuffer the contrary diſpoſition, altho they eat the moſt ſimple Food, ſend forth plentifully Acid and Stinking belchings: and indeed this ſeems to come to paſs even after the ſame manner, as when a little too much Yeſt is put to the Batch of Dough, it becomes bitter; or when too great a Portion of ſour Ferment, or Leven is put to the ſame Dough, the Bread from thence contracts a mighty ſowrneſs.

As the Blood in the Heart, and appending Veſſels, the Chyle in the Ventricle, ſo the Animal Spirit is wrought in the Brain, whoſe Original and Motions are very much in the dark. Neither doth it plainly appear, as to the Animal Spirit, by what workman it is prepared, nor by what Channels it is carried, at a diſtance, quicker than the twinkling of an Eye. But it ſeems to me that the Brain with Scull over it, and the appending Nerves, repreſent the little Head or Glaſſie Alembic, with a Spunge laid upon it, as we uſe to do for the highly rectifying of the Spirit of Wine: for truly the Blood when Rarified by Heat, is carried from the Chimny of the Heart, to the Head, even as the Spirit of Wine boyling in the Cucurbit, and being reſolved into Vapour, is elevated into the Alembick; where the Spunge covering all the opening of the Hole, only tranſmits or ſuffers to paſs through the more penetrating and very ſubtil Spirits,

Spirits, and carries them to the ſnout of the Alembick : in the mean time, the more thick Particles, are ſtayed, and hindred from paſſing. Not unlike this manner, the blood being delated into the Head, its ſpirituous, volatil, and ſubtil Particles, being reſtrained within by the Skull, and its *menynges*, as by an Alembick, are drunk up by the ſpungy ſubſtance of the Brain, and there being made more noble or excellent, are derived into the Nerves, as ſo many ſnouts hanging to it. In the mean time the more craſs or thick Particles of the blood, being hindred from entring, are carried back by Circulation : But the highly agil and ſubtil Spirits enter the ſmalleſt and ſcarcely at all open pores of the Brain and Nerves, and run through them with a wonderful ſwiftneſs : For there is need only of ſuch Receptacles and Channels, for the Animal Spirit, in which there are none, or at leaſt very ſmall cavities or holes; otherwiſe the blood or excrementitious humours, their Followers and Companions would not be excluded. Alſo, beſides, if theſe Spirits ſhould run about through too open and looſe ſpaces, being eaſily diſſipated, they would fly away: wherefore, when there is need of a Pipe for the tranſmitting of blood, or ſerous water, the Spirit of Wine runs rapidly through the ſecret paſſages of the Inſtrument or Leather. Neither doth the more ſtrict frame of the Brain and Nerves ſerve only for the ſtraining of the ſubtil from the thick, and the pure from the impure ; but alſo that ſpirituous and moſt ſubtil Liquor, being as it were diſtilled from the blood, gets yet a farther perfection in the Brain ; for there being inſpired by a certain Ferment, whereby it is yet more volatiliſed, it is made more fit for the performing the offices of motion and ſenſe. Becauſe the ſubſtance of the Brain is exceeding full of a Volatile Salt, which is of great Virtue for the ſharpning and ſubtiliſing the Spirits ; therefore the Spirits of Harts Horn, or of Soot, are far more penetrating than Spirits of Wine.

The Seminal Veſſels and Genital Parts, do ſo ſwell up with Fermentative Particles, that there is nothing more : here Spirit, Salt, and Sulphur, being together compacted, and highly exalted, ſeem in the Seed to be reduced as it were into a moſt noble Elixir. Theſe kind of active Principles do not only Ferment in the Womb, for the forming of the Child or Young ones, but alſo as it were with a living Ferment, they inſpire through all the Body, the whole Maſs of blood, that it may be more Volatile, and more ſharply Hot : wherefore in women who have the Ferment of the Womb in good order, their Face is furniſhed with a curious and flouriſhing colour, their heat is more lively and copious ; moreover, the Maſs of Blood growing too rank, there is need of emptying it every Month by the Flux of their Courſes ; but when this Fermentation from the Womb is wanting, both Virgins and Women become Pale, and as it were without blood, ſhort winded, and unfit for any motion. Alſo in men, from the Seminal Ferment, happen abundance of heat, great ſtrength, a ſounding Voice, and a manly eruption of Beard and Hair ; by reaſon of the defect of this, men grow womaniſh, to wit, a ſmall Voice, weak Heat, and want of Beard are cauſed.

Since we Treat of Ferments, which are found in the Animal Body, we may here opportunely inquire, what is the uſe of the Spleen : concerning which all good things are ſaid by ſome ; that it is as it were another Liver, and ſerves for the making of blood, for the *Viſcera* of the lower Belly : It is by others reputed to be of a moſt vile uſe ; that it is only the Sink or Jakes, into which the Feculencies of the blood are caſt. By reaſon of its ſtructure, we make this ſort of conjecture ; becauſe the Arteries, do carry the blood to this, and the Veins bring it away, neither any other thing is carried in, or conveyed out, and for that its ſubſtance is filled with black, and ſtagnating blood, it ſeems that it is as it were a ſtore-houſe for the receiving of the earthy and muddy part of the blood : which afterwards, being exalted into the Nature of a Ferment, is carried back to the blood for the heating of it : Wherefore, while the blood being carried by the Arteries enters the Spleen, ſomthing is drawn from it, to wit, the muddy and terreſtrial Particles, which are as it were the dregs, and *Caput Mortuum* of the blood ; that by this means the whole Maſs of the Blood, might be freed from the Melancholick or Atrabilous Juice ; which is ſeparated in the Spleen, even as the yellow Bile or Choller, is in the Liver : wherefore, for the moſt part the Spleen is of a black or blewiſh colour, by reaſon of the Feculencies or dregs there lay'd up. But as this Juice depoſited in the Milt or Spleen, is not altogether unprofitable, but by reaſon of the plenty of fixed Salt, is of a very Fermenting Nature ; it is not preſently, as the Choler, caſt into the ſink, but is farther Cooked in the Spleen, and being exalted goes into a Ferment ; which being laſtly committed to the

blood

blood, promotes its motion and Volatiliſation: Wherefore, as ſomthing is drawn from the blood, entring the Spleen by the Arteries, to wit, the Crude Juice of Melancholy; ſo ſomthing is continually added to the ſame, flowing back through the Veins, to wit, the ſame Juice concocted and exalted into the Nature of a Ferment: Even as Chymiſts, in Diſtilling, that the Liquor may be made better, ſeparate the Subtile and Spirituous parts, from the *Caput Mortuum*, and then pour them on it again; and this work they ſo often repeat, till the *Caput Mortuum* or dead Head, is by frequent Diſtillation Volatized, and the Liquor rightly exalted, even in all its Particles. That this is the uſe of the Spleen, it is a ſign, for that this inward being ill affected, the blood either ferments too much, as in the Scorbutick and Hypochondriack Diſtempers; or if the Spleen be obſtructed, or beſet with a Scirrhous Tumor, the blood is deſtitute of fit Fermentation, and cauſes the Dropſie, Cachexie or evil diſpoſition of the Body, or the Tympany.

As we aſſert, the Earth and muddy part of the blood, which conſiſts chiefly of Earth and fixed Salt, being ſeparated in the Spleen, to paſs there into a Ferment; ſo it ſeems not improbable, that alſo the Aduſt, or as it were the fiery part of the blood, to wit, the Yellow Bile, which conſiſts chiefly of Salt and Sulphur, being ſeparated in the Liver, and from thence tranſmitted to the inteſtines, ſerves for ſome uſe of Fermentation. For this being mixed with the Chyme or Juice, fallen from the Ventricle to the inteſtines, makes it there to grow hot and to ſwell up; whereby both the Elementary Particles are more overcome, and by reaſon of the Rarification or ſwelling up, the purer part is wrung forth into the Milky Veſſels, for the Nutritious Juice.

We are not only born and nouriſhed by the means of Ferments; but we alſo die: Every Diſeaſe acts its Tragedies by the ſtrength of ſome Ferment. For either the Sulphureous and Spirituous part of the blood, being too much carried forth, boils up immoderately in the Veſſels, like Wine growing hot, and from thence Feavers of a divers kind and nature are inkindled: or ſomtimes the Saline part of the blood, being too much carried forth, ſuffers a Flux; and from thence it being made acid, auſtere, and ſomtimes ſharp, is apt for various Coagulations: from which the Scurvy, Dropſie, Stone, Leproſie, and very many Chronical Diſeaſes ariſe.

Yea we alſo endeavor the Cure of Diſeaſes by the help of Fermentation: For to the preſerving or recovering the Health of man, the buſineſs of a Phyſician and a Vintner, is almoſt the ſame: the blood and humors even as Wine, ought to be kept in an equal temper and motion of Fermentation: wherefore when the blood grows too hot, even as Wine, it is uſual to empty ſome out of the Veſſels, and to allay its Fervor with temperat things. If any extraneous or heterogeneous thing, is mixed with it, unleſs growing hot of its own accord, it drives it forth of doors; Purging, Vomiting, and Sweating Medicines, by ſhaking and fuſing the blood and humors, promote its ſecluſion: when that the blood is depauperated, and grows leſs hot than it ſhould do, Cardiacks, Digeſtives, and eſpecially Chalybeats or ſteeled Medicines reſtore its vigor and Fermentation: no otherwiſe than Wines growing ſowr or degenerating into a deadneſs or want of ſtrength, are mixed with more rich Lees, whereby they may Purge or grow turgid anew. I could eaſily unfold the Curatory intentions, as alſo the effects and operations of every Medicine, according to the Doctrine of Fermentation; but I deſign a particular meditation for this thing: for the perfecting of which ſerious work, God willing, I have determined to add to the buſineſs of Medicine, as I hope, ſomthing not unprofitable.

Having thus far wandered in the ſpacious field of Nature, we have beheld all things full of Fermentation; not only in the diſtinct Provinces of Minerals, Vegetables and Animals, do we diſcern the motions and effects of this, but alſo the whole Sublunary world, ſeems as if one and the ſame ſubſtance were planted, and very pregnant through the whole with Fermentative Particles; which in every Region and Corner of it, as little Emmits in a Mole-hill, are buſied in perpetual motion and agitation; they fly about here and there; ſomtimes upwards, ſomtimes downward they are hurried, they variouſly meet one another, aſſociate themſelves, and again depart aſunder; with a continual Viciſſitude they enter into divers Marriages, and ſuffer Divorces, on which the beginnings, the death, and tranſmutations of things depend. Theſe little Bodies do not only very much abound in the boſome of the Earth, or in the midſt of the waters, but they are eſpecially diffuſed through the whole Atmoſphear of the Air

Air in thick heaps. It is sufficient that I have noted in this place, some examples in a word: I have not determined a more full speculation of them here. It is time that we proceed from Physical things, to the works of Art.

CHAP. VI.

Of Fermentation, as it is performed in Artificial things.

IN the works of Art, so various and manifold provision of Fermentation is perceived, that it is altogether impossible to enumerate their several Species; or to reduce the divers instances of this to certain Classes or Heads of distribution. Making use of the thrid of the following method, we will subjoyn some examples, (which have happened to our observation) by whose rule, many others may be laid open.

Concerning Fermentation, which is made in the Subjects, made by hand, or human industry, these three things are chiefly to be considered.

First, of what Nature and Composition Bodies are, that are most fit for Fermentation, and which are less convenient for it.

Secondly, What things are requisite about Fermentation, to wit, what are wont to promote, or also to hinder its motion in every Subject.

Thirdly, How manifold the motion of Fermentation is, and the end of it; also what are the effects and alterations which follow it.

As to the first, That all Bodies, (when tending to perfection) may truely Ferment, they are required,

In the first place, That there be some parts loose and disjoyned; otherwise the Fermentative Particles will not be stretched forth, or move from place to place: Wherefore in the more hard compacted things, or in viscous things, or too much boyled, or evaporated to a spissitude or dryness, Fermentation does not succeed. What are Liquid, as Wine, Beer, the Juices of Fruits and Herbs, easily and quickly swell up; next to these what are soft, tho they are of a thicker Consistency, as Bread, and most Eatable things, and Medicinal Compositions.

Secondly, It is required that there be an Heterogeneity of parts, or a confusion of all the Principles together; to wit, that some Particles do oppose others, and stir them into motion. For the more simple Bodies, in which one, or at most two Elements only are strong, with a very small proportion of the rest, are unapt to Ferment; because like Particles, or Symbolical Elements, lie benumed and quiet. But between the unlike, there arises presently a strife for domination, and some provoke others into motion.

Thirdly, There is a third condition, that there be neither too much Crudity, nor Maturity of parts, in the body Fermenting. In the former, the active and subtil Particles, are not easily extricated from the more thick, nor are brought into motion: as it appears in Juices, which are pressed forth from unripe Fruit; also in Beer which is made of Barly or Mault, not come forth or germinated. In the latter the Particles being made too volatile, are not contained in the bond of the mixture, but presently evaporate, and dispose their Subjects to Putrefaction. Wherefore, Juice expressed from Summer Fruits, or others too ripe, will not easily pass into Wine, but it will quickly corrupt. And for this reason, extravasated blood, milk, and urine, do not Ferment, but quickly putrifie.

As to the second thing proposed, there are many ways by which Fermentation is either promoted or hindred. The first and chiefest, is the adding of a certain Ferment to the body Fermenting; the Particles of which, when being first placed in vigor and motion, may raise up the others, idle and sluggish, in the to-be-fermented Mass, and may drive them into motion. But there is a two-fold Ferment; either absolute, which is the same kind of Body, in which the active Particles, being alto-

gether placed in their vigor, are notably in motion, and ſo whilſt they are committed to the Subject in Fermenting, ſnatch with them into motion other Particles there of the every kind before ſluggiſh: by this means Barm or Yeſt, beaten Eggs, and ſuch like, ſtir up a Fermentation almoſt in every thing. Or the Ferment is reſpective, to wit, which conſiſts of Particles, very much of one kind, which meeting other of another kind, in the Maſs to be Fermented, grow hot with them, and ſo produce in the mixtnre a turgency or riſing up of all the parts together. After this manner Saline Particles having gotten a Flux, grow very hot, with other Salines, either fixed or alchaliſate; as appears when acetous Liquors are poured on Corrals, Harts Horn, ſhells of Fiſhes; alſo when the Spirit of Vitriol, and the Salt of Tartar, are put together, a great ebullition is excited.

There are ſome accidents and external circumſtances, which variouſly conduce, either to the provoking or hindring the motion of Fermentation; of which ſort, are chiefly the condition of the Ambient Air, the placing or laying up of the body Fermenting, and the means of conſerving it.

The Southern Air (in which hot and humid Particles every where abound, which alſo entring eaſily any Bodies, obtain the force and place of a Ferment) impreſſes a notable motion of Fermentation in very many things: Wherefore in drinkable Liquors, it doth not only raiſe up at firſt, the force of efferveſcency or growing hot, but alſo for a long while after induces new ſwellings up in them being Fermented. On the contrary, the Cold and Northern Air, binds up, and very much faſtens Bodies; and in very many things hinders the fuſions, and flowings of the Elements, and oftentimes, either hinders Fermentation from being ſtirred up, or reſtrains it being begun. Alſo the hot Summer Air, becauſe it too much moves the active Principles, drives away the Spirits and ſubtile parts, exalts the Saline, and Sulphureous into a Flux, and ſo perverts their equal motion; and either the Sulphur or Salt being too much carried forth, it eaſily brings to Bodies a rancidneſs or putrefaction, or a mouldineſs; which nothing favours the buſineſs of Fermentation.

It is a vulgar opinion, that ſome ſelect times of the year, to wit, thoſe in which the Vegetables of every Kind flower, cauſe anew the motion of Fermentation in the Juices, and other things prepared of them, after they had Fermented a long time before; ſo that Beer, when the Barly, and Wines in the time that the Vine, flowers, conceive riſings up, or new Fermentations: they ſay alſo, that Bread and Flour, when the Wheat is in Flower, is want to become ſooner muſty and moldy: alſo that ſpots or ſtains of the Juices of Fruits, as the Mulberry, Blackberry, Rasberry, and ſuch like, being in Cloaths, are wont to be gotten forth again, at that time when thoſe Fruits are Ripe. Concerning theſe things, I ingenuouſly confeſs, that I have not made tryal of them, by my own proper obſervation; ſo as to dare to affirm it for truth in every part: I will therefore lightly paſs them over, for it would both grieve and ſhame me (leſt I ſhould relate falſe things) to Philoſophize concerning doubtful things.

Concerning the laying up of the Fermenting Body, theſe things are chiefly to be obſerved. When things firſt being to Ferment, that they are not to be ſhut up in too cloſe Veſſels, neither while the Liquors are hot, are they to be put into Bottles or Casks. For the Particles, at firſt boyling up, and as it were rarified, deſire a very large ſpace: wherefore the Fermentation of Wine or Beer, is begun in open large Veſſels: but when they grow leſs hot, thoſe kind of Liquors, leſt the Particles being ſet and moved into motion, too much, ſhould fly away from the Subject, they are kept beſt, either in a cold Cellar, or cloſe Veſſels. In the preparation of Vinegar, we obſerve the contrary, to wit, it is wont to be placed in a hot place near the Chimney or Oven, or expoſed to the Suns beams: to the end that the vinous Spirit being depreſſed, the Saline part might be exalted into a Flux, and ſo might give a ſharpneſs to the Liquor. There is another obſervation, that Liquors do Ferment better in wooden Veſſels, than in Glaſs, or Stone: For by long infuſion, ſome Saline little Bodies are got forth of the Wood, eſpecially the Oaken, which promote Fermentation.

As to the third thing propoſed, concerning this thing; although to ſpeak properly, the motion of Fermentation, is only a carrying forth of the Principles confuſed together, from a ſtate of Crudity towards maturity; and the end of it, is a tendency to the perfection of every thing: yet uſe or cuſtom hath obtained, that this word is attributed to very many other motions of Natural things, and includes other ends, and effects, far different. Therefore when the Fermentative Particles in any Body,

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are greatly in motion, the alterations which follow thereupon, may be in ſome reſpect referred to theſe three Claſſes.

Firſt, it either reſpects the exaltation, and perfection of the parts of the ſame Body; or the reſolution, and corruption of them.

Secondly, Or the diſſolution of the parts of another Body is intended: or the præcipitation of thoſe looſened.

Thirdly, By the motion and action of theſe kind of Principles, a coagulation, and alſo a congelation, now of the ſame Parts, now of different Bodies, are induced. It remains, that we briefly run through every one of theſe Species of Natural Motions, and ways or manners of Fermentation.

CHAP. VII.

Of Fermentation, as it is ſeen in the exaltation of Bodies, and tendency to Perfection.

THE Exaltation of the parts, is perceived beſt in Works, or in all things appointed for human uſe, foraſmuch as they get a greater perfection and vigor, by Fermentation; as, chiefly Aliments and Medicines do: in many of theſe, we endeavour to carry forth the Spirituous Particles above the reſt; and ſo to procure in the mixture, a grateful ſweet taſt, and other agreeable qualities; as we may obſerve in Bread, Beer, Wine, Cider, and many others: But in ſome, we ſtrive to exalt the Saline part, the Spirit being ſomwhat depreſſed; as in Vinegar, Meath, Broths, alſo in Sauce, Pickle, or in Preſerved things, which are made of Salt and ſharp Liquors. We rarely on purpoſe carry forth the Sulphureous part above the reſt, for from thence a ſtinking ſmell, and ingrateful rammiſhneſs, are wont to happen to eatable things. Among foods ſet apart for mans uſe, Bread, Beer, Wine, and Cider, have the firſt place; which owe moſtly, whatever they have of virtue, or ſtrength, to Fermentation.

Concerning the making of Bread, theſe things are chiefly to be obſerved: the Meal of Wheat, or Barly, or of any other Grain, being kneaded with common-water, is reduced to a maſs, to be afterwards baked in an Oven. If there be nothing elſe added to this, it becomes forthwith heavy, and ponderous like Clay, clammy, and of an ingrateful taſt, and of difficult digeſtion: but if in the kneading it, there be added a Ferment, the Maſs preſently grows hot, the bulk ſwells, and afterward being baked, it is made light, ſpongy, of good digeſtion and grateful to the taſt. If you deſire to know the reaſon of the difference, it is this. The meat of the Grain is imbued with a moderate proportion of Spirits, alſo of Salt, and Sulphur; but the Particles of theſe, are overwhelmed in the Maſs, with a viſcous humidity, being kneaded with water; ſo that they move not themſelves mutually, nor are in motion: wherefore in the baking, ſome ſuperfluous humidity evaporates; what remains is cleaving, viſcous, and becomes preſſed cloſe like Clay, and ponderous. But when a Ferment is mingled with the Mealy Maſs, the active Particles of the Ferment being firſt ſtir'd up into motion, take hold of their Companions in the Mealy Maſs, and carry them with them into motion. By this means, whilſt ſome move others, they ſhortly are all ſtirred up into Fermentation; tumultuating here and there, they compaſs and run through the whole Paſt or Dough, they ſubtiliſe and attenuate the clammy and terrene parts, and they lift up the maſs, with the motion, and make it hollow, with little holes; which yet in the mean time, leſt it become too ſpungy, and whereby the parts made hollow, and attenuated might more exactly be mixed, it is wrought with long kneading, then afterwards, before the Fermentation ceaſes, and before the hollowed parts ſink cloſe down, it is baked in the Oven. In the baking, the ſuperfluous moiſture evaporates, and moreover, very many Particles of Spirit, Salt, and Sulphur, fly away; wherefore, the maſs becomes lighter, and leſs ponderous, in the mean time, thoſe which remain in the Bread, being much exalted,

and brought to maturity, cauſe in it a laudable conſiſtency, with a grateful ſmell, and taſt.

The Ferment commonly uſed, is a portion of the Mealy Maſs, and unbaked, which is kept, being imbued with Salt, to a ſowrneſs (it is called in French *Levain*, becauſe it lifts up the Maſs) or the flowring of Beer, or Ale, called Yeſt or Barm; or for want of theſe the lees or dregs of Beer, or beaten Eggs, are made uſe of. In the mealy Ferment, the Saline Particles having gotten a Flux, do chiefly predominate; as alſo in the fæces of Beer: wherefore the Bread Fermented by theſe, is made harſh and ſomwhat ſowr: In the mean time, Yeſt being very big with Spirit, Ferments the Bread more potently, and brings to the Maſs lightneſs, and a very grateful ſweetneſs. Beaten Eggs abound with Spirit and a Volatile Salt, and do yet more cauſe the Bread to Ferment, and render it more Spongy: without doubt there may be other kinds of Ferments uſed; for whatever are big and turgid with Spirit, or abound with Salt carried out to a Flux, ſeem to be fit enough for this uſe.

Somtimes the mealy Maſs is kneaded with Sulphureous matter, as Butter, Sewet, Fat, or ſuch like, which being baked in an Oven, while it is hot, it is ſeen to be light and ſpongy, (to wit while the Sulphureous Particles, are kept in motion by the heat contracted in the Oven) afterwards, when this Maſs grows cold, it becomes heavy, weighty, and very cloſe: to wit, the aſcititious heat being exhaled, the Sulphureous Particles, before carried forth, at length ſink down; and when the Particles of the reſt, not being excited into motion, the Maſs therefore becomes as it were Infermentated: For in theſe kind of Subjects the Sulphureous Particles, becauſe they are very viſcous, hinder the motion of the reſt, nor can they themſelves perſiſt in motion, longer than they are forced, by the actual heat.

Bread is ſomtimes made of the flower of Wheat, or Barly, that is Germinated or Maulted, which without any Ferment added to it, becomes ſo exceeding hot, that it cannot be contained in a compacted maſs, but that in the baking it ſpreads abroad: the reaſon of which is, in ſuch Flower, by the Maulting it, the active Principles are before placed in their vigor, and exaltation; wherefore in the kneaded Maſs, when they are urged, by the heat of the Oven, they run forth inordinately, and force the more thick parts, hindring them, and as it were fling them down head-long. We have ſaid enough of making Bread; we will now paſs to Beer.

Beer is made of Mault or Barly, germinated and dryed, which is performed after this manner: Firſt, the Barly is put into common water for three days, that it may intumifie or ſwell, then (the water being let out from it) it is flung in a heap upon a dry floor, moving it twice or thrice a day, leſt it grow too hot, until it begins to germinate, or bud forth, or put out little ſhoots of Roots. Afterwards, by frequent caſting it about, it is hindred from germinating or ſpringing forth any farther, and laſtly, being lay'd upon a Kiln, it is made dry by roſting it; by this means, it yields a meat wonderfully ſweet.

The reaſon of this kind of proceſs is this; the Barly is permitted to ſpring forth, that its active Principles might be brought or ſet into their ſtrength, or exaltation: for when it germinates, the Spirit, Salt, and Sulphur, at firſt aſleep, and ſluggiſh, do ſwell up or grow big together, and their ſluggiſhneſs being caſt off, they are prepared to exerciſe their powers. The other preparations, hinder the Barly from germinating further, leſt that its Principles being very much looſned, ſhould exhale too much, and fly away from the Subject. The Meal of the Barly thus prepared grows ſweet, becauſe the active Principles are ſet in exaltation like Fruit brought to a maturity: wherefore alſo the Liquor impregnated with this Meal, grows very turgid or big with Spirituous and Fermentative Particles; when the ſimple decoction of Barly, ſcarce Ferments at all, nor is kept long, but that it becomes muſty, and inſipid.

But Beer is made after this manner; upon the Meal of the Barly, prepared as above ſaid, boyled water is poured, and is ſuffered to be macerated, or maſhed, for ſome hours, that it may be ſufficiently impregnated with the active Particles of the germinating Barly, now placed in their vigour: This Liquor being ſatisfied or filled, is drawn off clear from its ſetling, and is laſtly boyled, that it might get a ſomthing more thick conſiſtency, and be able to be kept the longer: Then, when it is ſomwhat cold, it is Fermented, a Ferment, or the flowring of Beer or Yeſt, being put thereto, and ſo tun'd up in a Barrel. Concerning its Fermentation, theſe things are eſpecial worthy of obſervation.

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If it macerate with, or ſtand too long on, the Maulted Meal, the Liquor becomes thick and clammy; and afterwards will hardly Ferment or Work at all: the reaſon of this is, becauſe the active Principles, in this work, are of a prompt motion, and move together with them, the earthy Particles; with which, if by a long ſtay, the paſſages and pores of the Liquor are filled; being too full, they are wholly obſtructed, and as the contents in the Stomach, ſtuffed to a ſurfeit, ſcarcely Ferment at all.

If too hot, or too cold, the Liquor be put into the Barrel; as in the great heat of the Summer, or the cold in the Winter, Fermentation doth not rightly ſucceed: for by too much heat, the Particles are diſſipated one from another, that they cannot, mutually take hold of one another, and ſo work; by too much cold, they are bound up and fixed, that they ſcarce enter into motion, neither perform it ſtrongly.

When the Liquor of the Beer Ferments in the Vat, the active Principles do on every ſide explicate themſelves, they precipitate in the bottom the more thick, and Earthy, being partly driven as it were into flight, and partly ſticking to them, they lead them as it were Captive to the top, and there make hollow bubbles continually growing up, and bring them as it were to ſervitude. After a due Fermentation, the whole ſpace of the Liquor is rendered clear and without dregs, in which the Spirits with a little Salt and Sulphur, do abound; in the mean time, in the ſettlement or dregs, a little of Spirit and Sulphur, with a greater plenty of Salt and Earth remains. So long as theſe ſhall be in their places the Liquor will be clear, ſweet, and Spirituous, but if long kept, or not ſhut up cloſely in a Barrel, great part of the Spirits will fly away: in the mean time, by the defect of theſe, the Saline Particles being exalted, and having gotten a Flux, impregnate the whole Liquor, and make it ſowr; for when Beer, as alſo Wine, goes into Vineger, it doth not happen becauſe they are wholly deprived of Spirits, (for ſo they would degenerate into a taſtleſs thing) but becauſe the Tartareous or Saline parts, are carried forth to a Flux, and infect the Liquor with their ſharpneſs; in the mean time, the Spirits being leſs in power, are depreſſed, that they cannot reſiſt them. Very hot weather, Thunder, the noiſe of great Guns, or the tunning it in the open Air, ſuddenly makes Beer grow ſowr, for by theſe means the Spirits being diſturbed in their equal motion, are diſſipated; and in the mean time, the Saline or Tartarous parts, being before ſeparated, and depreſſed, are moved, and carried forth into a Flux.

Indeed it plainly appears that the Spirituous parts in Vinegar, are not wholly deſtroyed, but ſuppreſſed only whilſt the Saline are placed in a Flux; becauſe from Vinegar, may be Diſtilled, a Liquor exceeding hot and burning, like the Spirit of Wine, after this manner: With the Diſtilled Vinegar, a Salt is extracted from Minium, or Lead Calcined, of which you have plenty, and ſhall diſtil it in a Retort, the Vinous and burning Spirit is driven into the Receiver; the reaſon of which is, becauſe when the Saline Particles of the Vinegar are united with the Salt of the Lead, the Vinous Spirits yet remaining are then freed; and having obtained their own right, they are urged from their lurking places by the heat of the Fire: but thoſe Spirits are not produced from the Lead, becauſe if you give thereto a more vehement Fire, the Salt of the Lead, will be melted into a Metal.

But we will return to Beer, from whence we have digreſſed; to which, how great a perfection happens, by Fermentation, appears by this experiment. If you take Beer new made, not yet purged by Fermentation, and place it to be Diſtilled in a Bladder or Cucurbit; only a vapid or taſtleſs water aſcends, without any Spirits, and ſtrength at all: but if you proceed after the ſame manner with Beer truly Fermented, you will have a hot water, and highly Spirituous. And this takes away the objection of ſome, who ſay that water being even impregnated with the Meal of Mault, ſhould not be any more boyled, leſt the Spirits ſhould exhale; becauſe the Spirits, before Fermentation, are ſo obvolved with the more thick Particles of the reſt, that they cannot break forth from the Concrete.

The more the Beer is impregnated by the Mault, the ſtronger it is, keeps the longer without ſowring; which is helpt if Hops be boyled therein, from which at firſt it grows bitter, but afterwards recovers a grateful ſweetneſs; the reaſon of this is becauſe the pores of Liquor, which are empty of the Particles of the Meal, when they are poſſeſſed by thoſe of the Hops, the conſiſtency is made more compact, and is more full of Fermentative Particles; wherefore there is not quickly given any room for the Flux of the Salt. But that the Liquor being at firſt bitter, afterwards grows ſweet,

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happens for this reaſon; becauſe the Spirituous and Sulphureous parts, ſupplyed by the Meal of the Mault, come not ſo ſoon to Maturity, becauſe of the others mixed with them from the hops being boyled therein: but when this happens, that they grow to maturity, they eaſily excel all the others, and impart a ſweetneſs to the whole. Not only Hops being boyled in Beer, keep it long from ſowring, but alſo many other bitter, or ſharp things, do the ſame: for theſe, foraſmuch as they exceed in a Volatile Salt, hinder the flowings of other Salt; wherefore, ſome are wont to put into the Barrel, a piece of Saſſafraſs Wood, the tops of Wormwood, Broom, the Firr-Tree, the rinds of Oringes, alſo Spices in a ſmall quantity; by which means, the Drink, tho of a ſmaller ſubſtance, is kept a long while from ſowring. Thus much concerning the preparation of Beer, on the conſideration of which, (as alſo of Bread) we have ſtayed long, becauſe the word Fermentation is chiefly due to theſe. Let us paſs next to Wines.

Excepting the Blood of Animals, there are no Liquors that grow hot, like Wines; there is found in none a greater plenty of Spirits, Salt, and Sulphur, or a more remarkable turgeſcency, or ſwelling up. The Fermentation of Wines, and the handling of them Fermenting, are wont to be taught among the Vintners or Wine-Coopers, as a ſecret only to their Apprentices, or the Adepti of their Art. Among them there is delivered a certain Phyſical Science, or Method of Medicine, by which means, the impurities of Wines are purged forth, their heats attempered, or alſo their defect, or ſickneſs may be healed. There are many ways to be uſed, beſides that of ſophiſticating, as a ſecret, by which depauperated and taſtleſs Wines are ſold for ſound and rich. But as to our propoſition, that the Doctrine of Fermentation might be illuſtrated, theſe three things ought chiefly to be conſidered, concerning Wines: Firſt, Their defæcation or cleaning, and their going into parts. Secondly, Their immoderate effervеſcency or growing hot, from what cauſes it is wont to be ſtirred up, and by what means to be ſuppreſſed. Thirdly, The declination of them, when they grow worſe: and by what remedies they are kept that they do not quickly paſs into a taſtleſneſs or Vinegar.

1. As to Firſt, That Fermentation may begin in the Muſt, there is not (as in Beer) required, the putting to any Ferment, for the Juice being expreſſed from the Grapes, doth ſo greatly ſwell up with active Particles or Principles, that it preſently of its own accord, grows remarkably hot: but it is a uſual thing in ſome regions, when the Grapes are trod, to beſprinkle them with Quick Lime, by the provoking of which, as a Ferment, the Liquor preſſed forth, grows more fervent, and is ſooner purged. The Muſt or new Wine, is at firſt put into open Tubs, for that they cannot be contained in cloſe Veſſels, for their great heat or working, which ſo boyls up, that water over a Fire grows not more hot: when the Wine is a little cooler it is put into more cloſe Veſſels, in which it is further purged by Fermenting. In the purifying, the Spirituous and Subtile Particles greatly ſhake the more thick dregs, and diſmiſs them from themſelves on every ſide, that the Maſs of the Vinous Liquor, being made free from the mixture of the dregs, is rendred clear and without dregs. The Fæces or Lees of the Wine conſiſt of Salt and Sulphur, with a little Spirit and plenty of Earth; which whilſt the Wines grow hot, being ſeparated by degrees, either by Coagulating themſelves mutually, are affixed to the ſides of the Veſſels under the Species of Tartar, or like Lees or Mother, ſettle to the bottom. In the mean time the Liquor ſwimming over them, is very clear and exceeding Spirituous.

Somtimes the defecation or clearing of Wines is hardly brought about, as a Vinous Liquor is not eaſily freed from the mixture of Tartar: wherefore Vintners are wont to put to the Wines ſome Bodies that either clear them, or precipitate them, ſo as the Earthy matter ſwimming in them, may ſooner ſettle to the bottom: The things which ſo clarifie Wines are of two ſorts: for they have either viſcous parts, as Glew, the Whites of Eggs and ſuch like, which ſtick cloſe to the fæculencies of the Wine with laying faſt hold on them, and carry them with themſelves towards the bottom: Or elſe they abound in a precipitatory ſtrength, which while they enter into the pores of the Liquor, thruſt forth the more thick Particles from thence, and ſtrike them down to the bottom; as are the duſt of Alabaſter, Calcined Flints, and ſuch like.

2. Wines tho at firſt they were well cleared, yet afterwards they conceive immoderate effervеſcencies, ſo that the Tartar, being ſtirred up from the bottom, it at length mingled with them; alſo the Spirits being looſened, now the Sulphureous Particles, now the Saline being too much carried forth, render the Wines unſavory, clammy

or

or ſowr. We will conſider theſe things, from what Cauſes they come to be ſo, and by what means they are Cured.

Wines very often contract heats, when they are full of Tartar or too rich Lees: For Tartar or Lees, tho ſeparated from the Liquor of the Wine, and depreſſed to the bottom of the Veſſel, yet for that they conſiſt of plenty of Salt and Sulphur, they ſtill ſend from themſelves Fermentative Particles, by the inſpiration of which the Wine is kept in an equal motion of Fermentation: and as the Wines are leaſurely ripened, ſo the Salt and Sulphur which lurk in the Tartar, are by little and little exalted; until at length, being carried forth to a Flux, they infect the Vinous Liquor, with a troubled feces or dregs, and compel it to grow immoderately hot, and to boil up. Againſt theſe too great heats of Wines, there is a neceſſity, that they be preſently drawn off or rack'd, from this too rich Lees, and put into another Veſſel, or elſe it comes to paſs, by reaſon of its too great diſturbance, the Sulphur being very much exalted, that they become unſavory and ropy; or the Spirit being loſt, and the Salt carried forth to a Flux, they contract a ſowrneſs, and turn to Vinegar.

Neither doth Wine grow more hot than it ſhould do, only from Tartar, or too rich Lees, but by too great agitation, immoderate heat, or by an extraneous or ſtrange Body put to it, and not miſcible, or that cannot mingle with it: for by theſe and other ways, the Sulphureous part of the Wine grows hot, and from thence conceives a fervour, and undue boyling up; for the ſetling of which, beſides the racking or drawing it off, from one Veſſel into another, they uſe to pour plenty of Milk, into the Pipe or Barrel, by whoſe mixture the heats and tumults of the Wines are preſently appeaſed; but as by this means the Spirits of the Wine are very much overcome, it cannot keep long, but ſoon after degenerates to Vinegar, or without taſt; therefore the Vintners are neceſſitated to ſell preſently the Wines mended by this Artifice, and very ſuddenly to draw them off.

Theſe kind of heats of Wines, tho they be timely appeaſed, before they wholly ſpoyl the Wines, yet they leave ſome viciouſneſs, by which the Vinous Liquor is altered from its due colour and conſiſtency, and is made leſs grateful to the Palate: for Wines made hot, oftentimes become of a more deep colour, *viz.* they degenerate from a watery and clear colour, to a Citron or Red, and give to the taſt a rankneſs; all which indeed proceed, from the Sulphur being too much carried forth and exalted: For theſe kind of diſtempers of Wines, they proceed after this manner; for the mending the colour, oftentimes ſimple Milk, or boiled with Glew or fine Flour, is poured into the Hogſhead or Pipe; for theſe procure a certain ſeparation of the exalted Sulphur, and with its whiteneſs give a clearneſs, or reſtore the colour to a brightneſs. Mucilaginous, clammy, or ropy Wines, are amended by the infuſion of burnt Alum; quick Lime, Gypſum or Plaſter of Walls, Salt and the like; for theſe cauſe a new Fermentation, that the more thick Particles are thruſt forth from the reſt, and precipitated towards the bottom. The unſavouryneſs is helped by the ſame means.

3. As to the third propoſition; Wines are depauperated or made poor, when by a long effervеſcency the Spirit and more pure Sulphur, being exhaled, the Saline Particles begin to be exalted: in this caſe their languiſhing ſtrength is ſuſtained with certain remedies, as it were Cordials.

As the Spirit and Sulphur being too much carried forth, and exalted, is cured by the drawing off the Wines from the rich Lees: So the ſame being depreſſed, the remedy is that they be put to a more rich Tartar or Lees: wherefore the Vintners, are wont to pour the depauperated Wines, deſtitute of plenty of Spirits and Sulphur, and which begin to grow ſowr, by reaſon of the Salts being carried forth to ſound and freſh Lees or Tartar; that they might as it were anew inſpired with Spirit and Sulphur, ferment and recover new ſtrength and vigor, beſides they make Syrups of generous and rich Wines, with Sugar and Spices, which they pour among the ſtale and deadiſh Wines. Further, for Wines turning to Vinegar, they are ſaid to adminiſter profitably, ſome other remedies. *Gratarolus* praiſes with many more, Lard and Swines fleſh ſalted, wrapt in Linnen, and put into the Cask: and truly it is probable that the Sulphureous odor of this doth reſtrain the Flux of the ſowring Salt; for this end the ſame Author commends Leek-Seed, Pine-Nuts, blanched Wheat, boiled Wine, Aſhes, the ſhavings of Willow, and many others, for the Salt readily acts on theſe kind of Subjects, and ſpends its force; even as Virgins ſick of the Green-

ſickneſs,

ſickneſs, deſire greedily to eat ſuch like abſurd things, that may ſatisfie the extraneous, and for the moſt part ſowriſh Ferment of the Ventricle, but very hurtful to themſelves. There remains another kind of Cure, whereby ſmall Wines almoſt corrupted, and growing vapid or ſmachleſs, recover new vigor for a time, to wit, a portion of Rheniſh Wine, or others, very Fermentable, is laid up, and hindred from Fermenting, from whence it is made a perpetual Muſt (commonly called Stum) if a little of this Liquor be poured into a Cask of ſtale Wine, and jogged together, it gives a freſh, and new Fermentation to the whole: ſo that that Wine will froth and boyl, and ſhut in a Glaſs will leap forth; but the drink mended by this Artifice, is accounted very unwholſom, for that it is apt to ſtir up an immoderate Fermentation in our blood: wherefore it is prohibited by Edict, that the Wine-Coopers or Vintners make not uſe of this kind of Sophiſtication.

It is a uſual thing alſo, to ſtop up cloſe, in Stone or Glaſs Bottles, for a time, ſmall Wines, and new Ale or Beer, which being afterwards opened, the Liquor ferments ſo impetuouſly, that being almoſt all ratified into froth, it flies forth of the Bottles: which beſides contracts ſuch an acrimony or ſharp cutting, that it can ſcarce be ſwallowed: The reaſon of which (as it ſeems) is this: The turgency or ſwelling up, and the notable acetoſity, ſharpneſs, or quickneſs of theſe kind of Liquors, proceeds chiefly from the Salt being exalted, and having gotten a Flux; for when as the Liquor, being full of much Tartar and little Spirit, is ſhut up cloſe in a Veſſel, all the Particles together are forced to be fermented, and when they cannot be ſeparated, and fly away from one another, they do the more trouble one another, and break themſelves into ſmall bits; that by this means the bond of the mixture may be wholly broken; but the little bodies looſened one from another, and as it were freed by reaſon of the cloſeneſs of the Veſſel, are forced together: wherefore when the Veſſel is opened, all the Particles at once being ready for flight, like Air ſuddenly rarified, break forth with noiſe and tumult; and becauſe the Saline parts having gotten a Flux, by reaſon of the plenty of Tartar, are ſtronger than the Spirit and Sulphur, from thence the notable cutting ſharpneſs is cauſed in the Liquor.

Cyder comes next to the Nature of Wine, to wit, of the ſmaller ſort, which kind of Liquor, is only the Juice preſſed from Apples, and brought to maturity by Fermentation: concerning this kind of Drink, it is worth obſervation, that if it be made of Summer Fruit, or too much ripened, it will not keep in ſtrength, but preſently degenerates into a deadneſs: but if it be prepared of very unripe, and ſowr Apples, it contracts a bitterneſs, for that the Spirits do not ſufficiently ariſe in this, but give place to the Salt, having firſt gotten a Flux: but in the other, they are not long enough retained, but wholly fly away, before the maſs of the Liquor attains to full Fermentation: but there are Fruits and Apples, exceeding fit for this buſineſs, which being indued with a more firm conſiſtency, are not quickly corrupted, neither do they attain their perfect maturity or ſoftneſs, but of a long time: The Juice of theſe wrung forth, and put into a Cask, does not grow hot, as Beer, with a great frothy head, but after the manner of Wines, with a noiſe, like a Pot boyling over the Fire: whilſt Fermenting after this manner, it is made clear, the more light recrements, are carried upwards, and remain in the Superficies, as the flowering: but the more thick parts and Tartarous ſettle plentifully in the bottom; but the more ſolid Cruſt, or Coagulated Tartar, is not fixed to the ſides of the Veſſel: which is a ſign Cyder is a more wholſom Drink, nor ſo infeſtous to the nervous ſtock, becauſe it abounds leſs with a ſharp Salt than ſmall Wines. The Liquor ſwimming over theſe Fæces or Lees ſettling in the bottom, enjoys it as it were its food, and is kept by its inſpiration in ſtrength; from which, if it chance to be drawn forth, it quickly grows ſowr: for indeed this kind of Drink, is in great danger to be deſtroyed by the Flux, or ſowrneſs of the Salt: againſt this ill, to preſerve it, ſome are wont to caſt into the Cask Muſtard Seed bruiſed, or Muſtard Balls, for that the Volatile Salt of this hinders the Flux of the acetous Salt, ſo that the Liquor thereby preſently grows clear, and keeps the longer: another kind of remedy againſt the ſowrneſs of Cider, is, that as ſoon as it begins to grow ſowr, it be drawn off from its Lees, and kept in cloſe ſtopped Bottles, with a little Sugar; for by this means it ferments anew, and becauſe, together with the Flux of the Salt, the Spirits being carried forth, are deteined from flight, a very grateful ſharpneſs is cauſed to the whole Liquor. Alſo, almoſt by the ſame preparation, and the like proceſs of Fermentation, a potable Liquor is made out of Pears, which is however above meaſure ſweet, and if plentifully drunk, renders the Belly looſe, as if they had taken Phyſick.

So

So much for Fermenting Liquors, whoſe virtue conſiſts in the Spirit being carried forth, and obtaining the height of perfection: there remains other preparations, whoſe vigor is placed in the Saline part being exalted, and having gotten a Flux; among theſe, Vinegar is of chiefeſt note, the way of making of which, being wholly unlike the aforementioned, requires a method of Fermentation, very different from thoſe before deſcribed: for example, ſmall Wines, or more generous or ſtrong Beer, being put up into the Cask, are expoſed in the Summer time, for a long while to the Suns Beams, or elſe in the Winter, they are kept near a Stove in ſome hot place; after this manner, whilſt ſome Spirits evaporate, the reſt being put under the yoak, the Saline parts are exalted and infect the whole Maſs of the Liquor with their ſharpneſs: but not only Wines long kept, or Stale Beer, out of which the Spirits of their own accord, begin to go away, but freſh Muſt, or new Beer, paſs after this manner into Vinegar; for the Country-women are wont to place without doors all the Summer, ſtrong Ale, and highly impregnated with Mault, in a Cask, by which means they make an exceeding biting and moſt penetrating Vinegar.

Yea after the ſame manner almoſt, our kind of Hydromels, Honnied Drink, or Meath are wont to be prepared: to wit, they boyl ſixteen parts of Water with one part of Hony, to the conſumption of a third part, adding then ſome Spices, togegether with a ſharp Ferment, they place the Cask and Liquor for many days in the Sun, and afterwards in a Wine-Cellar. It ſeems the Sunning of it is uſed, that thereby the Saline parts being brought towards a Flux, might ſomwhat reſtrain the nauſeous ſweetneſs of the Hony: and by that means the ſweet being tempered with ſharpneſs, a moſt pleaſing taſt is afforded to this Drink.

By reaſon of the ſharpneſs ariſing from the Flux of the Salt, alſo very many eatable things are wont to be prepared after various manners; hence the fleſh of living Creatures, and eſpecially of Fiſhes when they ſwell with too much Sulphur, are pickled with Salt Brine or ſharp Liquors, that the Salt being brought forth, they may become more grateful to the Stomach. It would be a tedious buſineſs to inſiſt here on particulars; but I will in this place deſcribe a certain noted kind of Oaten Broth, Grewel, or Flumery, which profitably nouriſhes Feveriſh, alſo Conſumptive and Hectick people.

This kind of Drink, that it may become gratefully ſowriſh, the Meal of Oats is put into common water for about three days, till it acquire a ſomwhat ſowr taſt: then, this infuſion is placed upon the fire, and with a Ladle is ſtirred about until it boyls, and when it riſes up ready to flow over the Veſſel, it muſt then be poured forth into a platter, and preſently cooled; it will appear like Gelly, and may be cut into bits; which if heated ſoon melts. In this preparation may be obſerved, that by a long infuſion of the Grain, the Saline parts being brought forth, do get a Flux; then theſe ſo impregnate the Liquor that the more thick Particles being by the heat brought into its pores and paſſages, they are ſo ſtrictly ſhut up, that they cannot eaſily ſink down, but that the whole mixture becomes like Gelly.

It would alſo be too great labour to heap together here, the various Condites and kinds of Pickles, for it would be to deſcribe under that rank the whole Art of Cooking and Diet. For in both the only aim is, that for healths ſake and for pleaſure, the active Particles in our food, may be placed in their vigor and exaltation; for ſo they greatly pleaſe the Palate, and by a more eaſie digeſtion go into nouriſhment: for this reaſon, not only Drinks, and Confections of Corn, and Herbs of a diverſe nature and kind are thought on; but alſo we variouſly prepare fleſh, both boyled and roſted, and add to them ſauces, that the Particles, now the Spiritous, now the Saline, being carried forth to a Flux, might pleaſe the taſt, with a certain ſharpneſs. Thoſe which are of a more fixed nature, are brought to exaltation, by Sauces made of Sugar, Salt, or Pepper. They are wont to keep ſome fleſh almoſt to putrefaction, that by that means, the active Particles being placed in their ſtrength and motion, may become of a more grateful taſt. Here might be interwoven, a long diſcourſe concerning Medicinal Compoſitions, but becauſe this ſubject, deſerves a peculiar conſideration, I will ſay nothing more of it here. Let us next ſee by what motion of Fermentation and Habitude of Principles, Natural Bodies tend towards diſſolution; or what is the progreſs of every thing to Putrefaction and Corruption.

CHAP. VIII.

Of the motion of Fermentation, which is obſerved in the Death, alſo in the Putrefaction and Corruption of Bodies.

NAtural Bodies in which Spirit, Salt, and Sulphur, are found in but a mean quantity, do not ſtay long in the ſame ſtate: for theſe active Principles are employed perpetually in motion: As ſoon as they come together, they tend from Crudity and Confuſion towards Perfection, for the ſake of which, when they have reach'd the height, they are able to come to, they are not quiet in this point; but from thence they make haſt towards the diſſolution of that thing. Thoſe which are more volatile do firſt of all break forth from the looſened bond of the mixture; then the reſt ſeparate into parts, until the form of the mixture wholly periſhes: The Spirit being carried forth to the top, flies away firſt with the water, and the more pure Sulphur, and by its expiration, diffuſes a very grateful odor; afterwards the more thick Sulphur, with the Salt, being looſened from the band wherewith they were tyed, and having gotten a Flux, by degrees evaporate, and together diſperſe a very ſtinking ſmell: together with theſe, the watery parts flow forth, and the frame of the ſubject breaks, or falls down into Earth or a *Caput Mortuum*.

This kind of proceſs may be obſerved both in natural things, and alſo in Subjects prepared by Art: Concerning Natural things, the disjunction of the Elements, and their ſeparation into parts, may be ſeen both in the death of living Bodies, or the extinction of life and vegetation; and alſo in the corruption of them being dead, and in their reduction to a rottenneſs.

As in Vegetables, the growth and maturity depend on the combination and mutual cleaving together of the Principles, ſo the decay and death depend on their going aſunder, and ſeparation, in Plants and Fruits; being by degrees exalted from a crude and ſowr Juice by Spirit and Sulphur, they come to maturity; to which a ſweet taſt and ſmell, and a pleaſant colour happen: then preſently the ſame matter, the Spirit and Sulphur, and the reſt of the Elements leiſurely flying away from the ſubject, is ſoon reduced to a filthineſs and rottenneſs: If after the ſubtil and more pure Particles of Spirits and Sulphur are flown away, there ſtill remain plenty of Earth and Salt, with ſome Sulphur, the matter does not putrifie, but grows dry with an hoarineſs: but if the thick Salt and Sulphur, having gotten a Flux, break forth from the Subject, together with the reſt, the bond of the mixture being looſened, preſently the external humidity, poſſeſſes the ſpaces left by theſe, and the Body is reſolved into rottenneſs.

Alſo all Animals whatſoever, have ſet bounds of their growth and duration: For they aſcend from their beginning, by ſlow increaſe, to motion and ſenſation; then to the ſtrength and exaltation of Nature: in which point they ſtay not, but from thence, by equal ſteps, make haſt towards their fall.

If the cauſe of this kind of limitation be required, we ſay that Mother Nature hath placed in the primigenious ſeed of every thing, ſuch a ſtock of Spirit, Salt and Sulphur, which might ſuffice for the producing the utmoſt thrids or lineaments of Bodies: ſo that the growth and aſcent of the thing, to its height or *acme* is only an evolution, or unrowling of that radical matter, and protenſion or ſtretching it ſelf forth into a greater dimenſion; in the mean time the little ſpaces and vacuities, which are made by the protraction of this matter, are filled up by the active Particles, ſupplyed by Nutrition, which alſo by a continual ſeries of motion are ripened, exhaled, and give place to others ſucceeding. As ſoon as this ſeminal matter is unfolded and exalted to the height, that it cannot be moved, or expanded further, the matter is then brought to the ſtate of its perfection: from thence ſome Particles of this Radical ſubſtance, together with the ſecondary ſupplyed from the Nouriſhment, begin to evaporate; and others dayly, and then others, being after this manner conſumed, both the

the ſolid parts, by degrees decreaſe in their ſubſtance, as alſo the Nutritious Juice and Blood, even decline for the worſe, till by a long waſting, the props of the Body, are made dry or withered, and the blood ſo depauperated, that it will not ſuffice for ſuſtenance to the vital fire: juſt as it may be perceived in a Lamp, if the Oyl being continually conſumed, in its place be put water, the Liquor is rendered poor, and diluted, that it is not able any longer, to cheriſh at all the flame of the wick.

When the Life of Animals periſhes, (either it expires after the aforeſaid manner leiſurely, and like a Candle or Lamp is extinguiſhed, the Oyl or Tallow being conſumed; or it is choaked by a haſty death, being ſnatched away by Fate, or the violence of a Diſeaſe) preſently the Spirits, with Salt and Sulphur, flowing together in the blood; and alſo planted in every part, ceaſe from their regular motion, and are moved into confuſion: then they partly exhale from the pores, with the vaniſhing heat, and partly being ſhut up within in the Cavities, inordinately Ferment, with the remaining Particles, and make a ſwelling up of the inwards, and of the whole Body. But afterwards the frame of the ſolid parts being by degrees looſened, and the Sulphureous Particles, together with the Saline, having gotten a Flux, begin to evaporate; from thence a ſtrong ſtink and corruption ariſe. The active Principles, breaking forth by heaps, do often mutually take hold of one another, and being combined in the ſuperficies of the Carcaſe, produce Worms: at length when they are wholly exhaled from the Subject, what remains falls into duſt.

It is a uſual thing for Worms to be generated in Vineger when it is corrupted and loſt its ſtrength, which being exceeding ſmall; and ſomwhat long and ſmooth like Eels, ſwim in the Liquor, and may by the help of Glaſs be expoſed to our Eyes; theſe beeing ſeen, it is commonly ſaid, that the ſharpneſs and pricking of the Vineger proceeds from theſe little Creatures, which is a vain thought that deſerves not a refutation; for they are only to be found in dead Vineger; and I pray from whence have they their teeth ſufficient for the gnawing of Iron? But the whole corroſive force of Vineger is more truly referred to the Salt having gotten a Flux: in the mean time thoſe little Creatures ſeem to be begotten by this means; it is ſufficiently known, that when very many Subjects are brought to putrefaction, the active Principles being thruſt out of doors, yet ſtill affecting their old dwelling, remain ſomwhere about the neighbourhood, and being joyned together, do often produce living Bodies; wherefore, when moiſt things putrifie, moſt often little Worms grow on their Superficies; but in Vineger the buſineſs is a little different, to wit, becauſe the Elementary Particles are more fixed, therefore when the mixture of the Liquor is wholly diſſolved, the active Principles, although looſened, yet breaking very hardly and difficultly from the ſubſtance, meet together in the bowels of the Subject, and there mutually cheriſhing one another, cauſe thoſe little Creatures in the midſt of the waters.

Alſo the Bodies of living Creatures, being prepared for our Food, are diſpoſed towards putrefaction, if they are put up for ſome days, till the active Particles are looſened, and begin to be in motion, tending to exhalation; wherefore both the Fleſh becomes more flaccid, and in eating more tender and ſoft: and if they are kept longer, till the Saline and Sulphureous parts being carried forth into a Flux, do break out, preſently a ſtinking ſmell and putrefaction is induced.

There are many ways whereby fleſh is wont to be kept from putrefaction; the chief of which are, that it be pickled with Salt or Spices. Things are kept a long time incorrupt and very grateful to the taſt, with Salt: Dead Carkaſes are imbued with Spices, that they may remain a long while in their Sepulchers. As to the firſt, Brine or ſalt Pickle hinders the eruption of the Sulphur, and fixes it in the Subject by its embracement, and retains it. Spices, as they conſiſt of very active Principles, ſtir up a new Ferment in the Subject, the dead Carcaſe; and the implanted Elements of this, joyn into the ſociety of their motion, and retain many of their Particles flying away, yet longer in the Body: As Salt and Spices are made uſe of for the preſerving long fleſh, and Sulphureous things, (which alſo preſerve all other things from Putrefaction) ſo Vegetables, and their Flowers and Fruits are better conſerved with Sugar: for this by cheriſhing the active Particles of the Subject, reſtrains them within, and beſides, renders the Confections, of a very grateful taſt.

Minerals, chiefly the ſolid and hard, becauſe they are indued with plenty of Salt and Earth, with little of Sulphur, and with a leſs quantity of Spirits, therefore they rarely, or not at all conceive Putrefaction: there is the ſame reaſon for reſinous things, which tho they abound in Sulphur, with Salt and Earth, yet becauſe there is but a

ſmall portion of Water and Spirits, therefore their frame is not eaſily looſened, neither are they obnoxious to Putrefaction. Among Minerals, Common-water only, falls under this rank: for this, if it ſtand ſtill, or is kept long in a Veſſel, its Salt and Sulphur, though but in a little quantity, having gotten a Flux, begin to evaporate, and together to induce Putrefaction: but ſo long as water is in motion, theſe Particles are ſtill involved with others, and ſo by their mutual embrace, are detained from evaporation.

Artificial things and preparations, are no leſs ſubject to Putrefaction than Natural things; for Bread, and all manner of Eatable things or Food, Wine, Beer, and other Drinkable Liquors, alſo Medicinal Confections, being long kept, firſt loſe their ſtrength and vigor, and then afterwards are Corrupted: concerning which, we may obſerve theſe following things.

The more the things are Compounded, and have all the Principles conjoyned together, the ſooner, and the eaſier, do they enter into Putrefaction; wherefore Eatable things, prepared of Fleſh, Broths, Decoctions of Herbs, alſo many Medicines made after the Galenical way, are wont (unleſs preſerved with very much Salt or Sugar) to be Corrupted in a ſhort time: In the mean time, Diſtillations, and Chymical Preparations, which conſiſt of Homogeneous, or not much different Particles, are kept ſound a long while.

In Compounded things, if there be too great quantity of water, things ſooner putrefie, for ſo the frame of the mixture is too looſe; ſo that the fixed Principles cannot take hold of the Volatile, or keep them back from flight: but thoſe in which Spirits abound with moderate Salt and Sulphur, if they are kept in a cloſe Veſſel, that they may evaporate but little, continue a long time, as may be perceived by ſtrong or generous Wine. The next to theſe, are thoſe things which are preſerved with Hony or Sugar, or in which the Saline Particles are in in great plenty by Nature.

Many of theſe, whilſt they are corrupted, are either made Moldy or Rank, or they grow ſowr, or degenerate into a vapidneſs, or without taſt: things are made Moldy, when the ſubtil Particles in the exhaling, are deteined by the more thick, and cleaving together by their mutual embrace on the Superficies of the Body, grow into a ſoft Down or Hoarineſs, even as Moſs is brought forth by Stones or Wood expoſed to moiſture.

Rankneſs or unſavory Taſt, happens chiefly in Sulphureous things, for Oyly and Fat things, by Heat or Age, become Muſty or Unſavory, to wit, when the Spirit being very much exhaled, the Sulphureous Particles are two much exalted, and begin to evaporate.

Sharpneſs or Acidity is induced from the Salt, being too much carried forth and looſened, for when the Spirit is depreſſed, or exhaled, the Salt being fuſed, conceives a Flux, and ſo brings in a Sowrneſs: hence Wine, Beer, Cydar, alſo Milk, very many Eatable things, and the Juices of Herbs, when they are long kept, or if they are moved by too immoderate heat of the Air, or ſhaking, do eaſily grow Sowr.

Liquid things, degenerate into a vapidneſs or taſtleſneſs, when the active Principles, are for the moſt part gon forth, and nothing eminent beſides Water and Earth, or of the ſubtile parts, is left in the Subject.

That I may contract what is aforeſaid; the corruption of every thing, is only the ſeparation and departure of themſelves from one another into parts of the Principles before combined, (the bond of the mixture being looſened) which motion, by reaſon of the diverſe diſpoſition of their breaking forth, (either with or without a ſtink) ends in Putrefaction or Rottenneſs.

Where Spirits abound, and that there is alſo plenty of Sulphur and Salt, and the Particles being looſened from their bonds, break forth in heaps; the mixture putrefies with a ſtink; alſo if it conſiſt of a thick ſubſtance, ſo that all the parts are not rightly ventilated, it conceives a heat from the Putrefaction: in ſuch a Corruption, the ſtink proceeds from the exhalation of the ſharp pointed Sulphur, or made pricking with the Salt: Putrefaction follows, for that the external humidity, enters into the place of the Particles flying away: But the heat is produced by the Sulphureous Particles being moved together in heaps, and being ſhut up within the Subject, that they gather together, and being united act more ſtrongly. But if there be in the Subject a leſſer proportion of Salt and Sulphur, ſo that when the mixture is looſened, the Particles are moved more ſlowly, and evaporate leiſurely, the Body grows dry, and is reduced to a waſting, without any ill ſmell, Putrefaction or Heat.

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It will not be from the purpoſe to inquire in this place, from whence ſome empty Veſſels, and more moiſt bodies, by lying long, conceive a certain ſtink without Putrefaction; alſo other things being put into them, or lying near them, are wont to partake of their Evil; for which affection, a proper Latin word is not eaſily to be met with; in our Idiom it is called Muſtineſs, and in ſome ſort ſeems to be deſigned by the word *Mucor*, unleſs that ἐυρὼς or *Mucor*, points at Bodies infected with a certain Down or Hoarineſs, (which we call Moldineſs) which here never happens. The conſideration of this matter is not improperly referred to the Doctrine of Fermentation, for this Tincture or Impreſſion of a ſtink, unfolds it ſelf far abroad, as if it were a certain Ferment, that the Veſſel but lightly imbued with it, infects whatever Liquors are put into it, and infuſions of them, even new and often iterated; we may obſerve a twofold effect of this thing: For ſomtimes the Veſſels being almoſt empty, at firſt vitiated, afterwards infect moſt Liquors, which they by chance receive, with a muſty odor: ſomtimes more moiſt compacted, and ſolid things, being kept long, ſomwhat cloſe in a Cellar, contract this vice of their own accord; when in the mean time the contagion is not perceived to be in the place where they were kept; which things either may become muſty, not becauſe they are corrupted, for in moſt Spirit, Salt, and Sulphur, being yet contained, in the bond of mixture, the frame of the matter is kept whole, but the vice only conſiſts in this, that from the Subjects after this manner diſpoſed, *effluvia's* as it were aculeated or ſharpned fall off, and therefore become ungrateful to our ſmell and taſt.

Firſt, that any Veſſel may conceive a muſtineſs, there ſeems to be required in the firſt place, that its inward hollowneſs be large, and its mouth narrow; to wit, whereby a paſſage may lie open to the outward Air, and reſt may be granted to it being entred in: for Juggs with broad mouths, alſo Bottles cloſe ſhut, do not eaſily get this fault. Secondly, that beſides the more ample inward hollowneſs, the ſides of the Veſſel be indued with pores, and very ſmall paſſages; for in theſe kind of little ſpaces beſmeared with humour, the Air being ſtrictly ſhut up, remains more quiet, and is apt to ſtagnate: Wherefore Glaſs Bottles are not ſo apt to ſuffer this evil as Wooden, or Stone Bottles. Thirdly, that ſome moiſture, tho very little, ſtick about the ſides of the Veſſel, or in its bottom, whereby the Air being entred may be intangled: for if the Bottles be hung up, with their mouth downwards, that all moiſture may drein out, they will never be muſty.

In the ſecond place: when Bodies, without any contagion of a Veſſel, contract a muſtineſs or moldineſs of their own accord, we may obſerve, firſt, that they are of that kind, which conſiſt of Heterogeneous Particles, that is, a mixture of all the Elements together; becauſe the parts of Vegetables and Animals, and preparations of them, eaſily receive this evil; Minerals for the moſt part remain free from it: Secondly, that there be plenty of humidity in the concrete, for the more dry continue a long while without any hurt: Thirdly, that the Bodies be either kept in a heap unmoved for a long time, or elſe in ſome cloſe Cupbord, or Cellar, without Air; for ſo Wheat or Grain, in a heap, unleſs it be often moved, as alſo all Eatable things, being put up in a cloſe place quickly grow muſty.

According to theſe poſitions we conjecture, that muſtineſs is made an affection to a moiſt inanimate Body, from the ambient Air, being admitted within its pores, and being got in there ſtagnating, whereby the Elementary Particles of that mixture, being combined together with thoſe ſent in by the Air, are exalted into the Nature of a Ferment; that they diffuſe themſelves on every ſide with wonderful activity, and their *effluvia's*, as it were ſharpned, ungratefully ſtrike againſt the ſenſories of the taſt and ſmell. When therefore, ſome Subject becomes primarily muſty, a certain portion of the Air placed near, and hindred from ventilation, enters into its pores and paſſages, and there being intangled with a tenacious matter, is wholly ſhut up within the ſubſtance of that Concrete. From the mixture of the ſhut-up Air, the implanted little Bodies of the matter, eſpecially the Sulphureous and Saline, acquire new heads; that afterwards, when they are exactly to be mixed with no other Body, yet very greatly Fermentative, tho intermingled with any other thing, retain their own Nature, and being diffuſed through the large ſubſtance of the matter, infect the whole; to wit, they diſpoſe by that means, the Particles of that new matter, that they being armed with ſharp points, bring in like manner a trouble to our ſenſes: But in the mean time, from the muſtineſs, whether primarily ariſen, or received by Contagion, the mixture of the thing is not diſſolved, nor the Principles diſſipated;

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yea thoſe things which are wholly taſtleſs, do ſcarce at any time become muſty: the muſty ſmell depends chiefly on the active Principles, diſpoſed by a peculiar rite, by the involved Air and their *effluvia's*; wherefore, if they almoſt wholly fly away from any Subject, that is rendred almoſt incapable of this affection.

There may be obſerved a certain likeneſs between muſtineſs and an Empyreuma, or taſt of fire or burnt-too, for as in this, the Particles of the fire being intangled, and included by a tenacious matter, by their long ſtay there, pervert the implanted little Bodies of Salt and Sulphur, from whence their *effluvia's*, ſtrike our Senſes with an ingrateful ſharpneſs; moreover, being mingled with other things, they affix to them, the diſpoſition of their pravity; ſo in muſtineſs, the Particles of the Air, being obvolved with a viſcous matter, and ſtagnating, they change by their preſence the Saline and Sulphureous little Bodies, from their due temper, whereby they being as it were gifted with ſharp prickings, do ſtrike bitterly our ſenſories, and being exceeding Fermentative, diffuſe their Odor to others: the alteration being either way contracted, can ſcarce be blotted out, by any mixture with other things, or emendation by Art: The chief means of helping of either, is by placing it in a reciprocal traject̃ion, *viz.* Empyreumatical things, or taſting of the fire, are to be a long while expoſed to a more moiſt Air, whereby the Particles of the Fire may exhale: and muſty things are to be held to the Fire, or put to ſuch things which may ſweeten their Nature, to wit, quick Lime, Sulphur, or Stygian waters, by which the parts of the included Air are driven away, and ſo the remaining little Bodies of the mixture are wont to recover their priſtine ſtate; wherefore, if muſty Liquors are diſtilled, the water falling into the Receiver, will be deprived of that ſtink: But the ſmatch of Fire or Empyreuma, is not ſo eaſily mended by this Artifice.

So much for Fermentation, and the motion of the Principles, for as much as within the Confines of the ſame Subject, they diſpoſe it, either to maturity and perfection, or towards diſſolution and corruption. It now follows to treat of the motion of the ſame kind of Particles and Principles, for as much as ſome of one Body do act on others of another Body, and by diſſolving the mixture, do wholly draw them forth, and ſend them outward, or by precipitating it cauſe them to go into parts,

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Chap. IX.

Of the motion of Fermentation, as much as is to be obſerved in the Diſſolution of Bodies.

FOR the Solution of Bodies, there are two great ſolvencies, or Menſtrua, which exiſt from Nature, to wit, Water and Fire: Fire, if it be next and immediately applyed, deſtroys moſt Bodies, drives away the Principles one from another, and as it were diſſipates them into Air, Earth only, with a little Salt, being left behind; if it be mediately applied, it brings away ſome Particles, ſo that in the mean time others remain: After which manner it ſerves chiefly for Diſtillations, and Chymical Operations, and is alſo uſed in the Preparation of neceſſaries for our Food, both about the Boyling and Roſting of Meats. Water does not ſo readily deſtroy Bodies, but it draws forth ſome parts from the Subjects, and receives them into its own Boſom, and firmly retains them for various uſes: But as it does not eaſily penetrate every Body, but leaves almoſt untouched thoſe which are of a more fixed Nature, various ways are thought of, whereby the Menſtruum of water is made ſharper, and is rendred fit for the diſſolving of any Bodies whatſoever. For by means of the Bodies, which it ought to diſſolve, and of the parts which it ought to receive in it ſelf, it is armed as it were with ſome Weapons; with which it is able to unlock any Subject, and to poſſeſs now theſe, now thoſe Particles. The Menſtruum of water is ſharpned with Spirit, Salt, or Sulphur: to wit, either with each of theſe, or with more of them joyned together; we will firſt ſpeak of the watery Menſtruum, with the various ſharpning of it, and afterwards of the fiery diſſolvent.

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Common water moſt eaſily diſſolves the more ſimple Bodies, except Sulphur; and hides their Particles, in its pores and paſſages; it readily receives Salts of every kind, and eaſily imbibes Spirits; it looſens the frame of Earth, and cheriſhes its more tender little bodies, in its embrace; but it is hardly mixed with Fat, and Oyly things, and receives not their Particles, but by the coming between of others, but drives them forth to its Superficies, as not miſcible, or thruſts them down to the bottom.

Water in ſome meaſure enters the more compounded Bodies, whoſe frame is ſomwhat looſe; and then receives into its boſom, ſome not ſimple Particles, but reſembling the nature of the whole mixture: hence moſt Vegetables, alſo parts of living creatures, and ſome Minerals, being put into common water, do impregnate it with a certain virtue; and from moſt Metals, by a long maceration, it takes away ſome ſtrength, though but ſmall. Some Bodies are diſſolved by water, which yet a Sulphureous or Spirituous Menſtrua leave almoſt untouch'd; as the Gums *Tragacanth*, *Arabic*, &c. alſo Salts and Sugar.

The firſt and moſt common way of ſharpning, whereby ſimple water may more eaſily enter the Bodies to be diſſolved, is, that it be furniſhed with fiery Particles, or darts of adventitious heat; for ſo it is driven more deeply with a certain force, into Bodies, and deſtroys ſome thrids, as it were the ſmalleſt mites, in their moſt inward receſſes. Wherefore we are wont to boyl for a long while, the matter to be diſſolved in water, or at leaſt to infuſe it in warm water, by which means, the more tenuious, and certain ſubtil Particles, which reſemble the nature of the Subject, are eaſily drawn forth, and impregnate the water, with the virtue of the whole mixture.

So much for the ſimple, or natural *Menſtruum* of water, to wit, for as much as its activity is wont ſomtimes to be promoted, by fire or aſcititious heat. But this cannot be ſo ſimple, but that it contains in it ſelf ſome Particles of another kind; as may be gathered from its eaſie Putrefaction; for oftentimes it is impregnated with Spirituous, Sulphureous, or Saline breathings, contracted from the Air or Earth; that for the drawing forth the tinctures of very many things, ſomtimes it excels an Artificial *Menſtruum*; for that Acidulous or Spawiſh waters, Mineral waters, Rain water, and *May* Dew, are of frequent uſe among Chymicks, for the remarkable faculty of diſſolving, with which they are ſtrong. Beſides, 'tis a vulgar obſervation, that ſome waters moſt eaſily diſſolve Sope, and being throughly mixed with the ſame, cauſes in the liquor a great ſpume or froth; ſuch, if they be rubbed between the fingers, feel ſoft and gentle; but other waters, which being handled with the hands, are more harſh, refuſe the mixture both of Sope and Oyl, and ſo are accounted unprofitable for the waſhing of Cloaths: theſe ſort of waters, if they ſhould be evaporated in a Glaſs, oftentimes affix a Cruſt to its bottom and ſides; becauſe they are impregnated, more than they ought, with Saline Particles, with which, when the Saline parts reſiding in the Sope combine, the Sulphureous are carried away, and they being excluded the pores, are thruſt forth as not miſcible, to the top of the Liquor. When Fleſh is boyled in theſe waters, it grows very red; which tincture indeed being thence contracted, is a ſign, that thoſe waters are ſomwhat imbued with Vitriol, or ſome other kind of Salt. But we will paſs to Artificial *Menſtruas*, in which the watry Liquor is furniſhed with Spirit, Salt, or Sulphur, being gathered apart, or many of them together.

The Spirituous *Menſtruum* of water is made, when from a Body ſwelling with Spirits, a clear and limpid water is diſtilled; as from Wine, or ſtrong Beer, or other Bodies truly Fermented, and brought to exaltation: The kind of diſſolvent is hardly to be had ſo ſincere, but it is mixed with the Particles of more pure Sulphur, and ſomtimes of a volatile Salt. The former kind of Liquor is called Spirit of Wine, which being ſubtil, and very penetrating, eaſily enters the Bodies, and parts of Vegetables, and alſo of living Creatures, but hardly Minerals, or not at all: it extracts from many things, not any Particles, or reſembling the Nature of the whole mixture, (as common water) but chiefly Spirituous, and Sulphureous, the reſt being almoſt untouched; wherefore, it is wont to be uſed for the reſinous *magiſteria* of Vegetables, (which it draws forth almoſt ſincere or without mixture, under the form of Gum or Reſine) in the mean time, it is not ſo fit as common water, for the extracts of Plants, which are not ſo indued with Sulphur: from Sulphureous things, as Benzoin, Sulphur, Olibanum, Styrax, Amber, and the like, it draws forth excellent Tinctures: It diſſolves the fixed Salts of Herbs, alſo of Pearls and Coral, before prepared

pared with Vinegar, by a long digeſtion, and receives their Tinctures into it ſelf: it leaves Sugar, and Gums, being diſſolvable in water, almoſt untouch'd. But there is another Spirituous *Menſtruum*, that is ſharpned with a volatile Salt, ſuch is the Liquor which is diſtilled out of blood, Harts-horn or Soot; it is far ſtronger than the former, and cuts moſt Bodies, except Metals, into parts, and oftimes deſtroys the forms of the whole mixture: yea it moſt excellently diſſolves ſecondarily, the moſt fixed Metal, to wit, Gold, being firſt reduced into a Calx, by its proper *Menſtruum*, and reduces it into a Tincture, or potable Liquor.

They are accounted Sulphureous *Menſtrua*, which are brought forth of Sulphureous Bodies, under the form of an Oyl: theſe are prepared, either by diſtillation, ſuch as are chiefly the Oyl of Turpentine, Juniper, and the like; or by expreſſion, ſuch as are wrung forth of Olives, Almonds, and other Fruits, or Seeds of Vegetables. Things diſtilled are of more efficacy, than preparations by expreſſion; either of them draw forth ſome Particles, from Vegetables, or Animals; by the vertues of which, theſe Oyls being impregnated, they are made fit for Medicinal uſe. Yea they are conveniently enough made uſe of, for the extracting of the Sulphureous Particles of Minerals, which ſomtimes they draw forth ſincere or unmixt: But if Oyl of Turpentine, or Lin-ſeed Oyl, draws forth by diſſolving, the combuſtible part of common Sulphur, in the mean time, the remaining Saline parts, and untouched by the *Menſtruum*, grow into Cryſtals; as is obvious to every one, in the preparing the Balſam of Sulphur.

Mineral Bodies, in which the bond of Concretion chiefly depends upon Sulphur, as are the Fire-Stone, Antimony, common Brimſtone, and the like, are in ſome ſort diſſolved by a Sulphureous *Menſtruum*, which draws forth of the Body, Particles of the ſame kind, the Saline being almoſt untouched: wherefore Oyl of Turpentine, Lin-ſeed, *&c.* draw forth a Tincture from theſe; in the mean time, Saline *Menſtrua* ſuch as are diſtilled Vinegar, or Stygian waters, profit little for the diſſolving their Bodies: but that theſe, unleſs before Calcined, hardly are touched. But on the contrary, where the frame of the mixture conſiſts of a Saline bond, ſuch as are Iron, Copper and the like, Saline *Menſtrua*, as *Aqua fortis*, Spirit of Vitriol, Salt, *&c.* receive in the diſſolving, the Particles of the ſame Nature into themſelves, the Sulphureous being almoſt untouched. This plainly appears, in the ſolutions of Metals, but chiefly and remarkably in Camphire, which Stygian waters reduce into a Liquor, in form of an Oyl, ſwimming on the *Menſtruum*; to wit, they diſſolve its frame, and receive ſome Saline parts, on which the Concretion depends, into themſelves; in the mean time the Sulphureous being untouched, they are gathered together apart, on the Superficies of the Liquor. There is ſomthing to be wondered at concerning Antimony: to wit, that its Concretion being very irregular, that Mineral becomes exceeding unlike, not only to other mixtures, but alſo to it ſelf; for it is very lax, nevertheleſs much compacted; it lies open to the leaſt injuries, yet is almoſt impervious to the greateſt, ſo that it may equally number its loſſes, with its Victories: ſome of its Particles lie ſo looſe, that they are brought away by any Oyly *Menſtruum*, or by a common *lixivium* or Lie: others in the mean while do ſo pertinaciouſly ſtick together, that *Aqua Fortis* cannot touch them, only *Aqua Regia* being poured upon it can know it; which ſo ſtrongly reſiſts it, that the fume raiſed up from thence, preſently obſcures the whole Room, wherefore there ſeem to be in this, parts wholly of a different Nature, ſome imperfectly mixt, *viz.* Earthy and Sulphureous, which are eaſily looſned by a fit ſolvent; in the mean time others wholly Metallic, perfectly mixt, coming near in ſome ſort to the Nature of Gold it ſelf; which therefore are only to be diſſolved, by a fit *Menſtruum* of Salt.

The Saline *Menſtrua* are of divers kinds and natures, *viz.* of Vegetables, Animals, or Minerals. Among Vegetables are eminent, the ſowr juices of Fruits and Herbs, Counterfeit Vinegars, acid Liquors diſtilled out of ponderous Woods, as Guaiacum, the Oak, and Box; in all which, the Saline Particles having gotten a Flux, either by Art or by Nature, give a notable ſowrneſs: or the Vegetable *Menſtruum* conſiſts of Salts of Tartar, or made by the cineration of Herbs, and diſſolved, which by the Fire are very much whetted, and acquire an acritude; in theſe the Saline Particles are fixed, and in a condition oppoſite to a Flux. To the rank of Animals I refer the Spirit of Urine, Harts-Horn, *&c.* which although they are impregnated with Spirits, yet they take their chief forces from a Volatile Salt. But the ſtrongeſt Saline *Menſtrua*, are drawn forth of Minerals, ſuch are acetous Liquors, which are moſt ſtrongly forced

forced by fire, out of the Salts of Nitre, Sea-Salt, Alumn, Chalcarth or Vitriol, and ſuch like.

Thoſe which are drawn out of Vegetables, as Vinegars, and acid Liquors do beſt of all diſſolve Corals, Pearls, Shells, and Shelly ſubſtances: becauſe in theſe there is great plenty of Alcalizat Salt, with which the fluid Salt, which abounds in thoſe kind of acetous *Menſtrua's*, deſires to be moſt ſtrictly united; wherefore they being applyed to the body to be diſſolved, enter its pores and paſſages, looſen the Complications of the Particles of the Alcalizat Salt, and ſnatch them into their own Embrace. Even after the ſame manner, the fluid Salt in a Vegetable *Menſtruum*, approaches the Volatile Salt in the Horns of Animals.

Theſe kind of *Menſtrua's* do corrode ſome Mettals towards the Superficies; but do not ſo potently unlock their bodies by diſſolving, as Stygian waters, ſome Sulphureous ſubjects, being before looſened by Calcination, do enter aptly enough, and from thence carry forth Saline Particles. Wherefore, for the Salt of Tinn, Lead, Antimony, Soot, and others, being firſt reduced into a *Calx*, we uſe diſtilled Vinegar.

The Salts of Tartar, and the fixed Salts of Herbs, although they ſerve for præcipitation, rather than diſſolution, yet becauſe they conſiſt of ſharp, and very penetrating Particles, they are of egregious uſe: For watry *Menſtrua's* are chiefly ſharpned with theſe, for the extracting of the Tinctures of Vegetables. And altho bodies which abound with an alcalizat Salt, as Pearls, Coralls, *&c.* are left wholly untouched by reaſon of the Homogeneity or agreeableneſs of the parts in either; and that alſo, they but little gnaw, only on the Superficies, being put upon Mettals, and grow together with their Salt, and Sulphur into ruſt; yet Sulphureous bodies they readily enter, ſo they be looſened by the fire, and unlock and pull aſſunder their joyntings or complexions; wherefore, for the making of the Milk or *Magiſterium* of Sulphur, the Salt of Tartar moſt excellently conduces.

Saline *Menſtrua's* are moſt ſtrong, which are forced by diſtillation out of Minerals, to wit, out of Vitriol, Niter, Sea Salt, Alumn, Arſenick; Acetous Liquors are diſtilled either from theſe ſingle, or from many of them mixed together; which as they are of the higheſt ſharpneſs, like to fire, readily enter moſt bodies, but chiefly Metallic bodies, and ſuch as conſiſt of a Saline bond, and diſſolve them eaſily into moſt ſmall parts. Theſe Liquors are only Saline Particles, which being driven by the force of heat, from the embrace of their Earth, having gotten by that means a Flux, are converted into water: as actual fire chiefly aſſaults Sulphureous bodies, and by deſtroying the body draws to it ſelf the Conſimilary parts; Stygian waters (which are alſo called potential fire) eaſily pull aſſunder bodies, which very much abound with Salt, as Mettals; and break them, inviolable by fire, into moſt minute parts.

Concerning the Solutions of Minerals, we may obſerve, that their frame is not eaſily deſtroyed, or looſened into parts, as other Concretes of Nature; but for this, moſt ſtrong *Menſtrua's*, and thoſe chiefly Acetous, diſtilled from Salts, are required; the reaſon of which is, for that the Concretion of Minerals, depends moſtly upon great plenty of Salt, binding the reſt of the Particles, as with a bond; wherefore their ſubſtance is more ſolid, more hard, and compact, and only gives place to a Saline *Menſtruum*. When any Mineral, or Mettal is diſſolved, the fluid Particles of the Salt, in the *Menſtruum*, moſt eaſily enter the moſt ſtrict Complications, of the fixed Salt in the mixture, and impervious to any other ſolvent, looſen them from their binding, and ſnatch them into their Embraces: after this manner, the Particles of the Salts being united, and dilated by the Liquor, are hidden in the pores and paſſages of the *Menſtruum*; and together with theſe, ſtick, and are alſo ſupped up, by the *Menſtruum*, the more pure and minutely divided bodies of Earth or Sulphur, which were in the mixture; in the mean time, the more thick, and more ſtuffed with Earthineſs, are præcipitated to the bottom of the diſſolving Liquor: wherefore Gold and Silver are wholly devoured by the *Menſtruum*; but Iron, Lead, *&c.* and alſo Metallick recrements, ſend forth from themſelves, in the diſſolving, Heterogeneous Particles, as ſo many offſcourings: when Minerals are broke into parts by this means, the divided Particles, and moſt minutely broken, (ſo long as they equally cohære with the Parti- of the fluid Salt, which are in the *Menſtruum*) being diſperſed through the Liquor of the *Menſtruum*, and hidden in its pores and paſſages, are ſupped up, and rendred inviſible. Yea alſo, the humor of the *Menſtruum* being taken away, the remaining

Calx, which consists of the Particles of a mixt, and fluid Salt, combined together, is dissolved in any other Liquor: but if after a Metallic solution, the fluid Salt be drawn off, from the Particles of the thing soluted, or by Calcination, it neither poyses any Liquor it is put to, with a new adjection of fixed Salt, nor do the little bodies of the thing soluted fall through the pores of the *Menstruum*, nor are they lastly supped up, by any Liquor added to them.

But that among Metals, some are corraded by any acetous Liquor; in the mean time others, as Silver and Gold, require a peculiar solvent, as it were to be unlocked by an appropriat Key: and what is more wonderful, common *Aqua fortis*, which eats Silver, leaves Gold altogether untouch'd: then the same Liquor by an addition of *Sal Armoniac*, is made a proper dissolvent of Gold, and has no power upon Silver: The reason of those may be thus understood: Gold and Silver are more compact Metals, very much cleansed from earthy matter; wherefore they are not broken into parts by any solvent, but only by those kind of *Menstruas*, which consist of a Salt homogeneous or agreeable with them. But as the frame or substance of Silver depends upon a Vitriolic Salt, and that of Gold, on an Armoniac Salt (or of a more perfect kind, to wit, such as is wont to be most strictly complicated with Sulphur) hence *Aqua fortis*, so long as it is strong with a Vitriolic Virtue, combines with the Salt of the Silver, and therefore unlocks its frame or substance, but doth not loosen the concretion of Gold, which depends upon an Heterogeneous bond: If that to this *Menstruum*, *Sal Armoniac* be added, the power of the Vitriolic Salt is blotted forth, and the Saline darts of the solvent are made fit only for the Gold, the Silver being untouched.

When Minerals are corroded by acetous *Menstrua's*, we are not therefore to think, the same always to be resolved into Elementary parts: that the Salt and Sulphur of them, may be had sincere or unmixt, by this means (altho some boast, that they are easily able to shew such Analyses of Mettals) for that it appears to our observation, and frequent experience, that many of these are of so compact and solid a Concretion, that they cannot be broken, but into integral parts: as for example, Gold and Quicksilver, after what manner almost soever handled, when they are reduced into manifold Calxes, will at last by a strong fire acquire their proper forms: *viz.* the Saline Particles of the *Menstruum*, loosen the bond of Concretion, whereby the most minute integral parts of the mixture stick one to another; but the same solvent, is not able in all things, to break assunder the *Copula* of the first mixture, whereby the Elements are mutually bound together: so that for the most part Metallic Calxes, are only little bodies of the Concrete, broken into most small little Globes, being involved by the Saline Particles of the *Menstruum*: Wherefore, fire being applyed, those corrosive Salts being pulled away from their Embrace, are wholly driven away; then the Metallic little bits, or dust, as so many little particular Globes being fused, by the intense heat, coming together into one Mass by melting, resume the Species of the Metall: wherefore, they who commonly affirm, that the Salts of Minerals for the most part, are only the Saline Particles of the solvent, conjoyned with the Metall, reduced as it were into fine flower, without doubt speak truth in the preparations of Sol and Mercury, or of Gold and Quicksilver; also the Salt or Sugar of Saturn or Lead, is nothing else: But that sweetness comes only from the Vinegar; for if in the distillation of Vinegar, the joynings of the Vessels are closed with Clay, and Salt, Chaulk and Horse-Dung, on the Superficies of this, grows together a most white Salt, wonderfully sweet, in every thing like to that Sugar: but from some, *viz.* from Iron, Copper, and Silver, are prepared fictitious Vitriols, which are for the most part Saline: For that the same, by distillation, may be forced into acetous Liquors, as the Metallic recrements.

Besides the solvence hitherto recited (which, by means of the Particles, which are strong in them, act upon a peculiar and determinate matter) I know that Chymists do boast wonderful things, of a certain universal *Menstruum*, by whose inspiration every body what ever, may be easily reduced to its Principles, or first Elements: And tho *Helmont* have bragged, that he had attained to this Secret by his own Labour, and now dayly the Adepti of Chymistry, do aspire to this end; yet the hopes and endeavours of most, have failed them in this work, even as in the Philosophers Stone. There are also some other famous *Menstrua's*, *viz.* The *Aqua vitæ* Tartarisated of *Quercitan*, and his Philosophic Vinegar, which are of noted use in the preparing of Medicines; but since I know nothing, or any strange thing they have done, in the dissolution of Bodies, we will pass them over.

So

So much concerning ſolvent *Menſtrua*: about bodies to be diſſolved, a certain proviſion ſhould be inſtituted, whereby indeed their complections may more eaſily be unlocked, and cut into moſt minute parts: Wherefore the Concrete is now pounded into powder, now cut into little bits, that the way might lye open for the ſolvent, to its moſt inward receſſes. If that the frame of the ſubject be harder, and more ſtrict, that it will not give place, but of a long time, to the *Menſtruum*, before the diſſolution is begun, there ought to be adminiſtred ſome aperitives, or openers, whereby the concretion may be firſt looſened, and ſomwhat opened: wherefore, the tincture of Steel, is more eaſily extracted, if its filings be ſprinkled with the juice of Limons, or the Spirit of Vitriol: in like manner Harts-Horn, or the ſhavings of Ivory are handled when we would have the decoctions of them quickly made: when formerly I have been very ſolicitous about this thing, *viz.* that I might render the more hard bodies eaſily ſoluble, in any *Menſtruum*, and that I had eſpecially tryed many things about Iron; after ſeveral experiments, at length by a certain chance, and almoſt thinking of ſomthing elſe, I found out a preparation, whereby without any Corroſive, or Acid Liquor, by the mediation only of a gentle heat, the body of Iron is opened, that being reduced into powder, gives immediately a tincture, to any Liquor, that neither Salts themſelves, are ſooner diſſolved in common water: By this means, I am wont to prepare ſuddenly, in great quantity, Mineral waters, which exactly reſemble our *Tunbridg* Spaws; and to render Wine, Beer, Milk, or Whey, with no trouble Chalybeated. By this means, Syrrops, Tinctures, Extracts, or *Magiſteria* out of Steel, are moſt eaſily to be had. Moreover, plainly by the ſame Artifice, Corals, Pearls, Eyes, and Claws of Crabs, and all ſhelly things, are prepared, that their powders preſently impart to any *Menſtruum*, a tincture, or the virtues of the whole Concrete. And in this preparation, no ſtrange quality is introduced to the Subject, nor its own proper quality loſt.

When I had by this means, learnt to unlock all Bodies whatſoever, conſiſting of a Saline bond, preſently from the Analogy of this, was made known the means of unlocking Subjects, whoſe Concretion is wholly Sulphureous: for I am wont ſo to prepare common Sulphur, that its powder immediatly impregnates any Liquor, with the tincture and virtue of Sulphur. The Spirit of Wine, ſuddenly contracts a deep colour, and very red, that being put into it. Common water by the infuſion, or decoction of the ſame Powder, is rendered clearly Sulphureous, and gilds Silver, and by this means, from that Tincture, a præcipitation being made of White Wine, or Vinegar, the Milk of Sulphur is eaſily prepared, in great quantity. Out of Sulphurated Wine by this infuſion, I make a Syrrop, than which there is ſcarce found a more excellent remedy, in the diſtempers of the Thorax. By this means, Tinctures, Extracts, Magiſtries, are prepared from Sulphur, with no labour, and without any ſmatch of the fire. By the ſame way preparations from Amber, Benzoin, and other Sulphureous things, eaſily diſſolvable in any *Menſtruum*, are compoſed. But enough and too much of this: we will now paſs to the other great diſſolvent of Nature.

CHAP. X.

Of the Nature of Fire: and by the way of Heat, and Light.

WE may almoſt pronounce the ſame thing of Fire, what the Philoſophers of old did of the firſt Matter, to wit, that it was potentially every where, and in all things; but in none, in act. For among theſe ſublunaries, Fire hath got no exiſtence of its own Nature, or certain means of duration: It is produced almoſt in every Subject, but is retained long in none, but it ſuddenly vaniſheth, and expires: yea unleſs ſome external accidents, oftentimes ſhould concur for its production, I think it had not at all been in the world. Some have dreamed, that its Sphear is ſcituate under the Moon: but this was introduced only, for the making the Hypotheſis of the four Elements: for ſuch a thing ſeems conſonant neither to Senſe, nor Reaſon. That we may rightly ſearch out the Nature of Fire, we muſt ſeek in what Bodies it is chiefly to be found, and how they are diſpoſed; and then we may proceed to the unfolding its eſſence.

The Subjects moſt convenient both for the producing, and the maintaining of Fire, are of that kind, in which there are very many Particles of Sulphur, and but only a moderate portion of Water, Salt, and Earth: for theſe do hinder its inkindlings, and being plentifully poured on it, extinguiſh it being inkindled: Wherefore Bituminous, Fat, and Oyly things, quickly take flame: ſo alſo Chips, Straw, light and dry Wood: in the mean time, Metals, Minerals, the glebe of the Earth, Dung, wet Straw, and green Wood, are hardly, or not at all to be inkindled.

Secondly, we obſerve, that all the time Fire continues in the Subject, Sulphureous Particles fly away in heaps, and from the departure of theſe, the ſubſtance of the burning body is by degrees deſtroyed; in the mean time, very much of Salt and Earth, remains in the form of Aſhes, after the burning.

There is a third obſervation, that when the Sulphureous Particles are wholly, or for the moſt part flown out of any Subject, the burning wholly ceaſes, and the form of fire is quite deſtroyed; nor can it be renewed in the remaining matter, wanting of Sulphur.

Fourthly, we will note, that ſomtimes ſome Bodies conceive a burning without the advention of another fire, only by their own effervency, and by the inteſtine motion of the implanted Particles, and of their own accord are reduced into Aſhes; as when wet Hay is layd up cloſe, it firſt grows hot, then afterwards breaks forth into ſmoke and flame; or the Wheels and Axeltrees of Carts or Wains, being heated by too great agitation, are inkindled.

According to theſe poſitions, we may affirm, that the form of fire, wholly depends upon Sulphureous Particles, heaped up in any Subject, and breaking forth from it in heaps: and that fire is no other thing, than the motion and eruption, of theſe kind of Particles, impetuouſly ſtirred up. For Sulphur is of an exceeding fierce and untamed Nature, whoſe little bodies, when (the yoak of the mixture being ſhook off) they begin to be thickly heaped together, diffuſe themſelves on every ſide like a torrent, break whatſoever obſtacles are in the Subject, deſtroy whatever comes in oppoſition, or fling it down headlong. Nor do they only unlock their proper Subjects, but alſo lay open the gates and doors of any other Subject near, that they can reach to, and there incite to the like fury, all the conſimilary Particles of Sulphur, and provoke them to an eruption: wherefore fire every where inkindles fire.

The Sulphureous Particles, while they, heaped together within the confines of their Subject, or on its Superficies, are agitated with a rapid motion, but are detained by the Embrace of other little Bodies, from a more free eruption, and more aggregated, conſtitute the form of fire; as is to be ſeen in burning Coals, or in glowing Iron; but when theſe ſort of Particles fly away by heaps, from the ſame Subject, and bound together, they produce flame, which is only an heap, or rather a torrent, of the Particles of Sulphur flowing together, and conjunctly flying away: if Watery, Earthy, and

and Saline Particles, are commixt with the Sulphureous breaking away, and are able to disjoyn and ſeparate them, only ſmoke is excited; which afterwards, the Sulphureous little Bodies more plentifully breathing forth themſelves, and getting together, breaks forth into flame.

The inkindling of Fire happens very many ways. The firſt and moſt ſimple is, when from hard bodies ſtruck one againſt another, but oftenеſt from a Flint ſtruck againſt Steel, ſparks of fire break forth; which being received in Tinder, made of a Linnen Cloth burnt to blackneſs, dilate themſelves, and then a Match or Sulphurated thing being applyed, they cauſe the inkindling of a flame. Secondly, a fire often happens in dry Wood, and dry things, when by the too great attrition of the parts, and agitation, being made hot, they conceive an inkindling of their own accord. And thirdly, when Bodies abounding with Sulphur, as Hay, or Flax laid up wet, (of which mention was before made) grow hot of their own accord, and afterwards are inkindled. The fourth way, is the moſt uſual, of introducing fire into any Subject, that it may be inkindled by another fire. We will a little more conſider the ſeveral proceſſes of theſe.

1. Hard Bodies ſtruck one againſt another, ſhake forth little ſparks of fire: as a Flint with Iron, or with a Flint; *Indian* Canes, the Fire Stone, and many other things. The reaſon of this is, becauſe the Particles of Sulphur, which reſide in the Superficies of a hard Body, if they are ſmitten by another hard Body, are not able to go back inward, (becauſe in hard things there is not afforded any ceſſion of the parts, from place to place) nor can the ſmitten Particles of Sulphur evaporate by degrees; but that by reaſon of the vehemency of the ſtroke, they are neceſſitated to break forth in heaps: Wherefore, when by this means, many of them are moved together, and are aggregated, they exhibit the apparition of fire, The ſparks being received into the half-burnt Linnen or Tinder, are dilated into a greater fire, for that the Sulphureous Particles, in ſuch a Subject are eminent, and are brought as it were to the very top it ſelf of eruption or breaking forth, wherefore by the leaſt ſpark being moved or ſtirred up, a way being made they fly away.

The very ſame reaſon is for Wood being made hot, and afterwards fired, by too great attrition; by which means, the Axeltrees and Wheels of Chariots, or of Mills, are frequently fired: for the Sulphureous Particles, being by this means very much moved, are more thickly heaped together; and when, having as it were made an Army, they are able to remove, or ſtrike away the reſt, they preſently break forth in Troops, and by their going away cauſe a burning.

In Hay or Dung laid up wet, the Particles of Sulphur very much abound; which having gotten the watery Latex for a Vehicle, run themſelves into motion: but when for want of Ventilation, they cannot by little and little exhale, being ſtraitned within, and ſo brought into their exaltation, they are able to joyn more one to another, and mutually to incite themſelves: then afterwards, being very much heaped together, they unfold themſelves more largely, and begin to break the Dens of the Subject, and ſo produce a burning. For it is to be obſerved in any Subject, when the Particles of Sulphur, being more ſlowly moved, fly away by degrees, neither heat, nor fire, but only a dryneſs, and leanneſs, ſucceed. But if they are more rapidly moved, than that they may be able to exhale leiſurely, a heat is ſtirred up in the Subject: then if yet they are agitated more vehemently, and impetuouſly, and being more thickly agglomerated or heaped together, they break forth in heaps, a deflagration or flame follows the heat.

Fire being inkindled in any Subject, enters and inkindles, whatever Sulphureous thing is next it. For as Saline *Menſtrua*, *viz.* Stygian waters, aſſault Metals, ſtuffed with Mineral Salt, and looſen their Saline Particles, as being of kin, from the mixture; ſo alſo the Sulphureous Particles, being inkindled, break whatever Sulphureous Particles are next them, and ſtir them up into the like motion of burning, with themſelves.

Thus much concerning the nature and production of Fire: it remains that we next inquire into the effects of Fire, and alſo concerning its virtue and efficacy; to wit, what kind of Bodies it diſſolves, and by what means; and alſo for what uſes it ſerves for. The chief effects of Fire are Heat and Light; either of them are excited by emanations, or *Effluvia*, ſent from an inkindled Body; but after a far different manner: for truly, heat is moſt often produced at a diſtance, without light; alſo light, without any ſenſible heat.

Heat,

Heat, foraſmuch as it belongs to the ſenſe of the touch, is conceived, when a certain paſſion is induced in the skin, or any other Organ of the touch, whereby the little Fibres and Nervous parts are drawn aſunder, moved into light Spaſms or Convulſions, and ſomtimes (if the ſtroke be vehement) ſuffer a ſolution of the union. This is wont to be done, either by the bringing near of Fire, or of another Body made hot by Fire, or by ſome other means. For from either, the Sulphureous or warming Particles being excited, into a more rapid motion, and breaking forth by heaps ſpread abroad, which, as ſo many little darts, being thruſt into our skin, or other Senſory of the touch, either by tickling gently, they bring to it a pleaſing ſenſe of heat; or by ſtriking it more grievouſly, the troubleſom ſenſe of burning or ſcorching.

For the effect of heat, Fire is applyed to Bodies, either immediatly, and ſo either for the ſake of Burning, Roſting or Boyling; or mediatly, *viz.* by the interjection of another Body. Bituminous things, Coals, and other things dug out of the Earth, alſo Vegetables and chiefly their Leaves, and Woods, are burnt, for heat, neceſſary for human uſes, and for the producing, and conſerving it. Stones are burnt for Lime; Vegetables for the preparing of Salts. The fleſh of Animals is wont to be Roſted, and the Fruits of Vegetables; whereby they may become better food for men. For by Roaſting, the ſuperfluous humidity is evaporated, and the Sulphureous parts being ſtirred by the neighbouring heat, are placed in their vigor and exaltation, by which means, they afford a more grateful food to the Palat, and of better digeſtion to the Stomach. By fire Metals are fuſed or melted, and moſt Minerals, whereby they are either very much purified, or they are better formed into various figuresby Smiths. Metals, and very many Minerals, alſo Salts, although they are not inflamed, and take a firing (becauſe they abound with leſs Sulphur, than Salt) yet by a violent fire, they glow, and ſuffer a fuſion; for that the Sulphureous Particles of the Fire, enter the Saline little Bodies, tho moſt compact, and diſſociate them for the time; which however pulled one from another, preſently the fire being exhaled, come again together, and are ſtrictly united.

Secondly, when fire is mediatly adminiſtred, the Particles of the ſoluted Sulphur, and heaped together into fire, are diſſociated, as when a cloud is diſperſed into moſt little drops of Rain: wherefore they lay aſide the form of fire; but tho diſperſed, they eaſily paſs through any impediment, and induce a ſufficient ſtrong heat to every Subject. By this means, fire is accommodated to very many uſes, the chief of which, and the more accuſtomed, are, elixation or boyling, digeſtion, and diſtillation.

In Boyling, the Particles of heat do paſs into a watery *Menſtruum*, and being united with its Particles, inſinuate themſelves deeply into the thing to be boyled: whoſe ſuperfluous humidities they carry away, digeſt the crudities, and carry them into a ſtate of maturity. Boyling is inſtituted, either that the Liquor might be impregnated with the ſtrength of the thing to be Boyled, or that the thing to be Boyled might be made tender, by the Liquor entring into it, and its Particles exalted: for Meats and all Eatable things, are rendered more grateful to the Palate by Boyling, even as well as by Roſting.

Digeſtion is very much uſed in Medicines, that their more ſlow Particles, may be carried to a greater activity; and ſomtimes, that they being too fierce might be fixed, and rendred more mild.

The moſt noble uſe of heat, or of mediat fire, is had in diſtillations; for the Particles of heat, do pull away ſome Particles of the Subject from others, (as it were by a Spagyric Anatomy) they reſolve all Bodies, into their parts and principles. But the conſideration of this thing, is too laborious and hard, to be inſerted into this Tract.

As heat reſpects the Senſory of the Touch, ſo Light that of the Sight, and affects it ſo after a proper and peculiar manner, that nothing at all is diſcerned, beſides the rays of light, direct, or reflected: for the various appearances of Colours, and the divers proportions of Bodies, and whatſoever we ſee with our Eyes, is only light; to wit, either proceeding directly, or ſtrait from a lucid Body, or retorted from another Body, to the Eye, and ſo formed into various figures and colours. The conſideration of Light, contains in it ſelf, very many ſtupendious things, and is of deep ſpeculation; which are not however proper for this place: It will ſuffice to take notice here, of a few things, concerning its Original, Motion, and Perceptibility.

Light

Light is wont to be diſtinguiſhed, either that it is Etherial, which flows from the Sun and Stars; or Elementary, which only proceeds from a fired Body, enkindled into a flame. It ſeems, that either is only flame enkindled in a greater dimenſion, and dilated into a moſt thin compoſition: for it appears to the ſenſe, that from Sulphureous things being inflamed, (as for example) from a burning Candle, moſt thin *Effluvia's*, or moſt ſmall divided little Bodies perpetually do ſpring; which being diffuſed into an Orb, and ſtretched forth into right Lines, as it were from the Centre to the Circumference, are ſtill expanded on every ſide, in a great heap, and fill all the ſpace within the Sphear of its activity, with a luminous ray. The Particles of the flame, which firſt fall away or depart from a lucid Body, are ſtill driven forward by thoſe following behind; and ſo theſe alſo by others; and ſo by a continued Series of Particles of the flames ſtill ſucceeding, the beams of light are formed, and are thickly or cloſly directed into all parts.

The motion of theſe is exceeding ſwift; like ſtreams of water, breaking forth with a force, they paſs through the medium in the twinckling of an Eye, and, as thoſe waters, if the motion be cut off near the Spring, moſt ſwiftly vaniſh. When the Rays of light come directly from a Luminous Body, they conſtitute a medium, only clear or lucid, without the appearance of any colour or image: when the ſame Rays meet with a ſolid Body, they do not paſs rightly through it, but being either broken off, they are drowned or loſt, or elſe they are reflected and leap back or rebound, as when a Ball being caſt againſt a Wall, with a continued motion is ſtruck back, upon other parts, according to the Angles of what ſtopped it. The Rays of light, reflected from other Bodies, being fallen into the Eye, repreſent the Images of viſible things, and the varieties of colours. For as the ſuperficies of viſible Bodies are rough, and indued with little pores, and innumerable eminences, or riſings up, hence the Rays of light, being moſt thickly impacted in them, and reflected from every part, according to all the ways of inclinations, and directions, as far as they go, do meet together round about, into very many tops of Cones, in which the beams proceeding from the whole object, as from a baſe, repreſent the image or ſimilitude of the whole; and in theſe kind of images, the medium is every where planted, that wherever the Eye is placed, it beholds the image of the ſame thing, though not wholly after the ſame manner. But foraſmuch, as the beams of the ſame light, being impacted in every Body, and variouſly refracted and diſtorted, about its rough and unequal ſuperficies, from thence reflected as it were with turnings and windings into the Eye, they cauſe the diverſe Phænomena or appearances of colours, to appear. For colous, and images of things, do not exiſt in their own nature, but as it were ſpectrums, only from another place, change their apparitions by the Rays of light. When dark night brings thick darkneſs to this inferior world, things are not perceived but by the Touch, and loſe all their appearances: when the Sun reviſits the Hemiſphere, he brings forth a new Creation of things; and the whole Atmoſphere is fillled at once, with a ſudden and manifold progeny, to wit, with infinite images of Bodies, and appearances of colours.

Therefore Light does not only illuſtrate the medium, that ſight may be made, as ſome would have it; but it alſo creates the very objects of ſight, and introduces them into the Penetralia or inward parts of the Eye, yea to the moſt inward receſſes of the Brain. This doth the ſame Office for the Eye, as the Intellect doth for the Soul, to wit, it forms the Ideas or Images of Bodies, and renders them perceptible by the viſive faculty. Light only is able to penetrate the Coats and Humors of the Eye, to move the little Fibres of the Optic Nerve, and to ſtir them up into an act of ſenſation. Becauſe the Images of things, being forged by the Rays of light, variouſly reflected, and meeting together on the tops of the Cones, are ſtayed within the Pupil, or dark ſpot of the Eye; they ſeem as objects in a cloſe Chamber, admitted by a ſmall hole, to be repreſented to the life: and the Concave or Convex Glaſſes, whereby the parallel beams are broken, or the inverſe reduced or brought back, do egregiouſly ſupply the humors placed in the Eye, beyond the induſtry of human Art; by the help of which, the image of every object is painted, near the thin skin of the Eye, in its juſt figure and proportion: and then, from the motion, which this Image impreſſes on the little Fibres of the Optick Nerve, the act of ſight is performed in the Brain. Thus much for Heat and Light, the Speculation of which, tho it may ſeem to be altogether beſides the Doctrine of Fermentation, yet foraſmuch as by the motion of theſe kind of Sulphureous Particles, many other Phyſical Operations are alſo performed, a brief

brief mention of them ought not to have been overpaſs'd in this place. But before we ſhall lay aſide quite the conſideration of Fire, it will be here worth our while to inquire concerning ſome Subjects, as it were irregular, to wit, in which fire ſhews admirable virtues, and beyond its common manner: of this ſort, are among Simples common Sulphur, and *Sal Nitre*; among Compounds, Gun-Powder, and *Aurum Fulminans*.

Concerning common Sulphur we may obſerve, that it quickly catches fire, heat it immediatly breaks forth into flame ſuch (as nothing beſides) that by its deflagration it puts out the Kitchen fire, that it ſends forth a blueiſh flame, and whitens all objects with its Smoke or Soot. If you behold the matter of this Subject, or the parts of which the mixture is compoſed, its Spagyrical Analyſis will exhibit, great plenty of pure Sulphur, a moderate quantity of Vitriolic Salt, a little of Spirit, Water and Earth. For when common Sulphur is diſſolved, by the Spirit of Turpentine, the Sulphurcous part impregnates the *Menſtruum*, with a very deep Tincture, and the Saline grows into Cryſtals: or when it is fired under a Bell, the Sulphur wholly burns, in the mean time the Salt being reſolved, and having taken a Flux, is fixed about the ſides of the Veſſel, and ſo exhibits a Liquor, moſt like the Spirit of Vitriol, or rather the very ſame. To which add, if you mingle the Oyl of Vitriol, and Antimony together, and diſtill it in a Retort, a Yellow Sulphur, juſt like the common, will be Sublimed in the neck of the Retort.

I ſay therefore, becauſe there are very many Particles of Sulphur in this Concrete, and that they lie looſe and unbound in the mixture, (to wit, neither divided and ſeparated by the coming between of Earth, or Water, nor much bound together by Salt) therefore they are of a moſt prompt motion: wherefore by the leaſt ſpark of fire, they break forth from the looſe frame; and becauſe very many run forth adoors together, therefore not a naked fire, as in every Combuſtible thing beſides, but firſt of all and immediatly a flame is inkindled. Its flame becomes blueiſh, becauſe 'tis almoſt pure Sulphur that burns, not mixed with the Particles of Water and Earth, as it is in Wood or Straw. The very ſame thing happens to Spirit of Wine being inflamed. It extinguiſhes the Kitchen fire by reaſon of the little Bodies of Vitriolic Salt left behind; and the ſame being eventilated with the flame and fume of Sulphur, gives a white colour to things; the like to which, the *Effluvia's*, exhaled from the Spirit of Vitriol, or Stygian Waters, do effect.

Concerning *Sal Nitre*, we will take notice, that it is not to be inkindled at all by it ſelf; but to be melted by an intenſe fire: but being mixed with any Sulphureous things, it breaks forth into a flame, with a certain force and exploſion: For being added to common Sulphur, Antimony, or Tartar, it burns with a thundering noiſe; alſo if you put into melted Nitre, a burning Cole, or Wood, the flame is exploded round about, with a wind, ſo that the matter put in is flung up and down here and there, and often times flung clear out of the Veſſel: by this kind of deflagration, what is Nitrous is conſumed, the fixed Salt (which is Tartar) remains. When Nitre is diſtilled, Sand or Brick duſt, is mixt with it in a double quantity at leaſt; otherwiſe the Nitre melting is not at all looſened into a vapor. In the diſtilling the vapor ſent forth is very red; ſo that the Receptacle ſhines with a ſplendor, as if a flame were ſhut up within it: a ſharp corroſive Liquor is ſtilled forth, which diſſolves moſt Metals; alſo Gold.

Theſe things being truly weighed, it ſeems that this mixture conſiſts chiefly of aboundance of Salt, and a little Sulphur, but theſe not fixed and idle, but either exalted, and ready for motion, and not without a certain reſiſtance bound together: to wit, the Sulphureous little Bodies, being rouled about by the Saline, and as it were ſtrictly preſſed, ſtill endeavour to get forth; but being ſtrictly bound within, they are not able to riſe forth by their own ſtrength, or endeavour: but as ſoon as, by the mixture and inkindling of another Sulphureous Body, the Particles of the Salt are disjoyned, and their Priſons unlocked, preſently the included little Bodies of Sulphur, as it were breaking Priſon, fling themſelves forth with violence, remove every Obſtacle, and ſtrike the Air violently with a ſudden eruption.

The reaſon why fire doth not inkindle Nitre, being incloſed in a Veſſel, but only melts it, when in the mean time, any Sulphureous matter being fired, makes it to flame forth with a noiſe, is, becauſe the little Bodies, which fall away from the fire, enter the Nitre, make it a little looſe, and diſſociate the concretion of the Salt, but not ſo looſen it, that a way may be made for the included Sulphur: but by the addition of

of Sulphureous things, the Saline compaction is more diſſolved, and is ſo far unlocked, that the Particles of the incloſed Sulphur fly away all together, and being freed from their ſtraightneſs, do hugely ſtretch themſelves abroad, and ſeek greedily an immenſe ſpace.

That there is plenty of Sulphur in Nitre, beſides its deflagration, the Geneſis of it ſufficiently teſtifies; for it is begot chiefly in places, where the Sulphureous Excrements of Animals abound. The uſe of it in agriculture argues the ſame thing, becauſe the fertility of the Earth depends very much upon it: And to this alſo, the flaming colour, ſhining in the diſtilling may perſuade.

From theſe premiſes, it will not be difficult, to unfold the nature of Gun-Powder, uſed in Warlike Inſtruments. For the ſudden firing, and vehement exploſion of it ariſe, for that thoſe very many, and almoſt infinite Particles of Sulphur, which conſtitute that fire-dilating Body, being fired, fly away together in a moment; all which breaking forth at once, a force being made, and deſiring a moſt free and ample ſpace, for their expanſion, violently move the Air, and all obſtacles, and ſo are exploded or thruſt forth with a noiſe. There is in this mixture, common Sulphur put, becauſe its Particles are looſe, and ready for motion, and therefore apt to move a quick inkindling: there is added Charcoal duſt, becauſe in that alſo, the little Sulphureous Bodies (as is ſeen in Tinder, that is made of half burnt Linnen) are brought to the very top of eruption; and therefore theſe preſently conceive an inkindling, and both theſe being fired, and oppoſed to the Nitre, they quickly looſen its frame, and ſend forth the Sulphureous Particles incloſed in it; which indeed break forth from their impediments with a force, and as the blaſt of a Bellows, encreaſe the ſtrength of the whole in firing. The Charcoal duſt is added in a moderate quantity; though it abounds with Terreſtrial matter, yet by reaſon of the Sulphur being carried forth in it, it accelerates the deflagration of this mixture: For the Coal and Nitre being beaten together, is ſooner fired, and with a greater exploſion, than Nitre and Sulphur: But if the Coals be added to this Compoſition, (as they are wont to make it for Cannon and great Guns) in a greater quantity than it ought, and improportionate to the Nitre, the immediat firing is ſomwhat retarded, by reaſon of the interjection of the Earthy matter; and it happens, that the Sulphureous little Bodies therein, apt to be too haſtily inkindled, are a little disjoyned, and ſo the ſubſtance of the infuſed powder, takes fire ſucceſſively, and by parts, and not all at once.

The reaſon of *Aurum Fulminans* does not ſo manifeſtly appear: but it ſeems wonderful, that the Calx of a Metal, otherways inviolable by fire, ſhould be brought into a powder, one grane of which, if it be but lightly heated by fire, is exploded with ſo great a force, and yields ſuch a noiſe, that is an hundred fold beyond Gun-powder. I know many deduce the cauſe of this, as in Gun-powder, from a Nitrous-Sulphureous mixture: For they ſuppoſe the Nitre drawn forth from the ſolvent *Menſtruum*, to joyn together with the Sulphur of the Metal, and ſo the powder from thence prepared, to get that fulminating force. But in truth, if this matter be better thought on, it will appear far otherways; becauſe this golden thundring powder, is not at all inkindled, as preparations of Nitre with Sulphur: for if fire be put to it, it goes off only ſucceſſively, by grains, nor as in Gun-powder, doth the whole fulminate at once; but being put into an Iron, Silver, or other convenient Veſſel, and for ſome time heated, by a ſudden fire, at length all the Particles being ſtirred together into motion, it is exploded with a mighty noiſe; but yet being exploſed, it yields neither flame nor ſparks neither is the Gold loſt. For if this powder fulminates in an open Veſſel; whatſoever is of the Gold, remains after the thundering, in the form of a purple powder; and may be gathered up. That the genuine cauſe of this may be extricated, there are ſome things to be obſerved, concerning its preparations, which will give no ſmall light.

For the making of this powder, it is altogether requiſite, that a ſolution of Gold be made with a *Menſtruum*, impregnated with Sal Armoniack, or at leaſt Analogical to it: for I have tryed it in vain with the Spirit of Nitre, Salt, with the Bezoartic Spirit, and ſome others. Then next it is requiſite, that the Calx be precipitated with Oyl of Tartar, for if the ſame be brought into a powder, with Silver or Mercury being caſt in, it loſes its thundring force. Alſo, if the Liquor of the Tartar, be too precipitately poured in, that with the great heat, a repercuſſion of the thing ſoluted be made, it often loſes its fulminating virtue: but a precipitation being leiſurely made, the powder ſetling in the bottom is waſhed away, by the often pouring on of warm water, which, though it be moſt often waſhed and dryed, far exceeds the weight of the diſſolved Gold.

According to theſe poſitions, in ſeems moſt likely, that whilſt the Gold is diſſolved by an appropriate *Menſtruum* for this buſineſs, ſome little Bodies of *Sal Armoniack*, (or ſome other reſembling it) being greatly akin to the Gold, do moſt ſtrictly cohere with its Particles; which then by the Salt of Tartar leiſurely in the precipitating infuſed, are more fixed, and more ſtrictly tyed faſt together: and then the exploſion of this powder, or Solary Calx, is nothing elſe than a violent eruption of thoſe kind of Salts, from the Coheſion or Embrace of the Gold. For when the powder prepared after this manner; is brought to the fire, or is otherways made hot: the heat cauſes the *Sal-Armoniack* Particles, or others of the ſame nature affixed to the Solar, to diſſociate; which notwithſtanding, (when they hardly depart one from another) are not pulled aſunder, but by a ſtrong and continued heat: yet afterwards being pulled aſunder with a certain force, by reaſon of the ſudden and violent breaking off, they ſtrike the Air impetuouſly, and ſo cauſe a moſt ſtrong noiſe, for their bulk. But in the mean time, if the exploſion be made under a Silver Spoon, you will ſee a ſeparation made of either Particles, here the Solar of a Purple colour, there the Saline of an Aſh colour. But that this powder doth not make a noiſe, unleſs it be leiſurely precipitated with the Oyl of Tartar, it is becauſe ſome Particles of the Salt of Tartar, being before bound together with the *Sal-Armoniac* Particles, do couple together, by which means all are more ſtrongly combined: For the Salt of Tartar being pounded with the mixture of Nitre and Sulphur fixes their Particles for a time; that this Compoſition is not preſently inkindled by heat; but afterwards is exploded with a ſtrong noiſe. And powder prepared after this manner ſeems to imitate the Nature of *Aurum Fulminans*: and it is probable that from other Minerals diſſolved and precipitated by reaſon of the ſtrict Coheſions of the Salt with the Metallic matter, and their violent abruptions, thundering Calxes may be prepared. That truly the preparation of this chiefly depends on the Combination of the Salts, it appears, becauſe, if in the Precipitating (as I have known it ſomtimes to have hapned) the Oyl of Tartar, being too haſtily infuſed, the Complexion of the Salts is diſſolved with the Metallic matter, the powder falls in ſmall quantity to the bottom, and of a very Purple colour, whoſe grains are fragments of almoſt moſt pure Gold, and therefore they do not fulminate at all: afterwards in that precipitated Liquor, very many ſlender Cryſtals grow together, which are indeed the Salts, having ſuffered a Divorce from the Metal. Beſides, That the Salt of Tartar, brings ſomthing to the preparation of this powder, it is a ſign, becauſe thoſe things which take away the fulminating force from this, are of the ſame Nature, which chiefly work upon the Salt of Tartar; as a beating it together with common Sulphur, Spirit of Salt, Oyl of Vitriol, or of Sulphur: for theſe grow hot, and greedily deſire to be joyned with the Salt of Tartar, and ſo they call it away from the Embraces of the Gold; by which means the Combination of the Salts, with the Particles of the Gold, is looſned, and therefore loſes its Gun-like force. What is commonly ſaid, that this powder will be preſently inkindled, or exploded, by a moſt light heat, or by ſhaking it in an Iron Ladle, is nothing true, as appears to me, for I have often tryed it. Nor is it more worthy of belief, what is ſaid, that this only forces downwards, and breaks the thickeſt hollow Pipes with its force; in the mean time, that it doth not move or ſhake any thing laid over it, becauſe long ſince I made tryal after this manner; two grains of this being laid in a Silver Spoon, I covered with a Doller, then a Candle being held under the Spoon, upon the exploſion of the powder, there followed a great noiſe, and there was a little hollow made in the bottom of the Spoon, almoſt through, and the piece of mony was carried up with a force to the Cieling, wherefore, when this *Aurum Fulminans* is exploſed, its force is diffuſed round.

Altho vehement heat, and incited, and alſo the emiſſion of Smoke and Soot, depends for the moſt part upon fire; yet ſomtimes we perceive it to be produced in ſome ſubjects, and that in a very high degree, without its being actually inkindled. A moſt known inſtance of which thing is, quick Lime ſprinkled with water: which alſo Stygian waters ſhew, being mingled with Iron, the Butter of Antimony, and with the Salts of the ſtagma of Vegetables. The learned men, *Gunter*, *Conringius*, *Hogelandus*, and almoſt all that have touched on the Doctrine of Fermentation, have delivered the effects of this Nature, as eſpecial examples of Fermentations, wherefore it will be worth our labour, to inquire ſomthing concerning each of them: but on this condition (which I alſo have obſerved in other diſquiſitions) that I willingly let alone the opinion of others; for a Traveller had rather drink at the Fountains

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themſelves: I will then as briefly and ſuccinctly as I can diſpatch the buſineſs.

Quick-Lime is made of the Lime Stone, alſo of many others (excepting only ſuch which conſiſt of a reddiſh and as it were ſandy grain) being Calcined in a cloſe Furnace, for many days, with a reverberating fire: by this means, the frame of the mixture is looſned, that it goes into a friable matter, or that may be crumbled, which by reaſon of the high attriction or binding Nature, in which it excels, ſerves moſt excellently for the making of Cements for Walls: This Calx or Lime being taken from the Furnace, reteins ſtill the form of Stone, and ſeems cold to the touch, but water being poured thereon, it ſwells up, and grows wonderfully hot, ſending forth ſmoak, that it burns all Bodies that are put into it, beſides it falls of it ſelf into a white duſt: To which Particles this motion and heat ought to be aſcribed, *viz.* whether to thoſe implanted in the Lime ſtone,or to the others acquired by the fire,doth not eaſily appear: but that we may looſe this knot, if we can,. I have inſtituted this Analyſis of quick Lime. I put about half a pound of it into a large Cucurbit, then water being poured thereon, I fitted the little Head with a capacious Receiver, by and by, within five minutes of an hour, the matter began to ſwell, and to grow very hot; then a ſmoak, and a breath being raiſed, all the Veſſels became ſo hot, that I could ſcarce touch them with my hands. A clear water Diſtilled forth into the Receiver, about ſix Ounces, which was not ſharp, but of a Styptic or Aſtringent ſweetiſh taſt; the remaining powder in the Cucurbit, I boiled with common water, and the Lye thereof made, I endeavoured to boil away with a gentle Fire; while it did evaporate, there gathered together on the Superfices of the Liquor, a white and cruſty little skin, alſo of a ſweetiſh taſt, and the ſame being taken away, preſently a new one ſucceeded; the humor being at laſt wholly exhaled, there remained in the bottom nothing that was ſharp or ſalt.

We may Collect from this, that this heat doth not proceed from the implanted Principles of the Lime ſtone, *viz.* either Saline or Sulphureous however moved within themſelves: for only a ſweetiſh Salt was to be found in it, which was alſo Volatile; and it is a ſign that there is not much Sulphur in the Limeſtone, becauſe by a long Calcination, the form of the mixture is not quite deſtroyed, nor its ſubſtance wholly broken: wherefore, it is very likely, that whilſt theſe ſtones are burnt in the Furnace, ſome Particles of Fire do ſtrictly cleave to the Saline, and ſo reſide in that mixture, as it were ſtrangers; which whilſt they lie a ſleep, and continue idle, and being ſeparated one from another, by the coming between of Earth, although they are very many, do not raiſe up heat; For all heat depends upon motion: but when water is poured to it, thoſe fiery Particles, being thruſt out of their Cells, flow together, and fly aways by heaps from that Inn; ſo breaking forth by Troops, they cauſe a very intenſe heat, and becauſe diluted with water, only a ſmoak, and not an actual Fire.

It is a ſign that little Bodies of fire, or fiery Particles, do ſtick a long while in matters Calcined, becauſe Iron Inſtruments, according as thoſe Particles are driven forth of their pores, more or leſs, leiſurely or by heaps, become ſoft or hard; tough or brittle: moreover it is obſerved, that bricks or freſh Earthen Veſſels being dipped in water, cauſe a certain hiſſing; alſo Tobacco Pipes, if one end be put into water, and the other brought near to the Ear, yield a certain ſharp noiſe and rumbling: add to theſe, that fixed Salts being Calcined, or having ſuffered a Flux by the Fire, become far ſharper; alſo Stygian waters, by reaſon of thoſe kind of little Bodies involved therein, which afterwards leiſurely evaporate, perpetually ſend forth ſharp fumes: and when theſe are poured upon Saline Calxes, not only an Ebullition is raiſed, by reaſon of the diſagreeing Particles of the Salts, which ſtrike one another mutually, whereby they might be more ſtrictly combined; but beſides, heat and ſmoak ſucceed, which for the moſt part ariſe from the fiery Particles being ſhuck out of their Dens. But it is not eaſie to give a reaſon why quick Lime, and no other Concretes, retain ſo copiouſly thoſe kind of fiery Particles, and yield a ſtrong heat, water being poured on them.

Tis plain enough that when the Sulphureous Effluviums of Fire, (foraſmuch as they are moſt penetrating) enter all Bodies whatſoever, brought near, affect them after divers manners: thoſe which are more lax, and ſtuffed with active Principles, are deſtroyed wholly by burning, and becauſe their ſubſtance decays, the fiery Particles, as Soldiers in a City ſpoiled by themſelves, do not continue long in the ruined place,

but go farther, and move their Tents: but where the Concretion of the Subject is very compact, and that its Elements cannot be ſo pulled in pieces by the fire, that they rather grow ſtiff, as is ſeen in Metals, Glaſs, Bricks, and other things made hard, either by boiling, or fuſion; the fiery Particles entered in, being received in an incommodious Inn, preſently go forth again; and therefore few are wont to ſtay in mixt things of this kind, or in things fuſed, or Calcined: but if fire be ſo applyed to the more hard Concretes, of which ſort are moſt ſtones, and ſhelly Concretes, that the bond of the mixture be unlocked, ſome parts, *viz.* the Watery and Sulphureous are driven away, and ſo ſome ſpaces are made hollow, very fit for the receiving any ſtranger; in the mean time, that the frame of the matter be not wholly deſtroyed, but that it may continue its compacted and ſtony form, which flows not away together with its Particles, and ever threatens its ruin; in ſuch a Subject, chiefly the Particles of fire, poſſeſſing the ſpaces of the parts flown away, copiouſly remain; and there cleaving cloſe to the Saline little Bodies, being detained one from another, by the coming between of the earthy, lie quiet; which notwithſtanding afterwards, being violently driven from thoſe Inns, are able to produce by their eruption, an intenſe, and almoſt fiery heat: in the mean time thoſe Saline little Bodies, are ſo looſned, by the long familiarity of the fiery, and by the embrace of one another, and of the ſtrangers, that they become Volatile, and being diluted with water, for the greateſt part evaporate with it: and the remaining Salt, becauſe alſo Volatile, and having ſuffered almoſt a divorce from all the reſt of the Principles, is both ſweetiſh, and becomes deſirous of Conjunction, and aſtringent; and therefore alſo is of excellent uſe for plaſtring of Walls.

But that Stygian waters, being poured upon the Stagmas of fixed Salts, produce heat, and the ſame mixed with Iron, or the Butter of Antimony, ſtir up a mighty ardor, with a blackning ſmoak, the reaſon ſeems plain. As to the Stygian waters and fixed Salts, it may be ſaid that both theſe Concretes are only Salts, having got divers ſtates by the fire, and ſo either being very much ſtuffed with fiery Particles (which are the moſt minute atoms of Sulphur:) But they being confuſed together, do forthwith ruſh into mutual embraces, and becauſe the Particles of either, are made unlike, therefore, whereby they may be more ſtrictly united, there is made a great attrition of parts, and together an excuſſion of the fiery Particles, from whence the great ebullition, with a heat is excited: when the ſame *Menſtrua*, are poured on Iron, or the Ice of Antimo, the Salts of either come together, and ſhake forth the fiery Particles, and alſo the Sulphureous Particles, before implanted in either Subject; which flying away in heaps, cauſe a ſmoak with a heat, but not a flame.

CHAP.

Chap. XI.

Of the motion of Fermentation, as it is to be observed, in the Precipitation of Bodies.

WE have hitherto treated of the Solutions of Bodies; it remains now that we speak of Precipitation, this is performed only in Liquids, which, when as they are stuffed with Heterogeneous Particles, are compelled by a matter Precipitating those Particles, to separate one from another, and to obtain for their substance, divers places and conditions: wherefore, since in this operation, there is an agitation and motion of parts, its consideration ought to be referred to the Doctrine of Fermentation.

Precipitation is performed, either in Natural things, as chiefly in Milk, Blood, Urine, and perhaps in some others; or in Artificial things, which are of a diverse Kind and Nature: but they may be described and ranked in a certain order, according as the Liquor to be Precipitated, or Precipitating, is either Spirituous, Sulphureous, Watery, or Saline: besides, according as the Particles separated from the rest, are either Elementary, (*viz.* either Sulphureous, Earthy, or Saline) or Integral, which participate of the Nature of the whole mixture, and are only very small portions of it very much broken.

There are two common and known ways of Precipitation, whereby is made from Milk, both Cheese, and Butter: As to the first, if any sharp thing be poured into warm Milk, the thicker and Cheesie parts, presently separate from the serous and thinner, and are gathered together into a thick substance. The reason of which consists in this: Milk has a somwhat thick consistence, and its pores and passages are very much beset, with the thicker (to wit the Cheesie) contents; wherefore when somthing more subtil and penetrating, (as is Rennet) passes through the Liquor, it easily thrusts forth the more thick Particles, with which the pores were possessed; which then mutually Embrace one another, and are separated a-part from the thin, and Wheyie Liquor. When Milk is kept long to a sourness, it is Precipitated after the same manner, without Rennet, by warming it over the fire. For in stale Milk its Saline parts get a Flux, then being stirred up by the fire, supply by their own sourness the turn of Rennet, yea it is not improbable that the fluid Salt in the Rennet provokes the Saline Particles of the Milk, into a Flux, and that for this reason chiefly its Coagulation succeeds: for that the Saline parts having gotten of their own accord a Flux, so bind the pores of the Liquor, that the more thick Contents are willingly exterminated from them: wherefore we do say, for that reason, the same thing happens, when a Flux of the same Salt is caused by some thing else put into it. But that the Coagulation of Milk happens, not only by reason of the passages and pores being possessed by a strange Body, the sign is; because the Salt of Tartar, tho exceeding Precipitatory, effects nothing of this, and this effect is excited almost only by four things. Sugar hinders the Precipitation of Milk, and many other Liquors, because it restrains the Flux of the Acetous Salt, and as it is easily Soluble, and its Particles are soft and blunt, they extrude not the former Contents implanted in the Liquor, but fill all vacuities, that afterwards there is no space whereby another Precipitating Liquor may unfold it self, and break into anothers quarters.

But Country people are wont to make Butter of the Flowers or Cream of Milk, kept for the most part to a sourness, only by shaking or Churning it. The reason of which (as it seems to me) is this: in Cream there is great plenty of Sulphur, with which also a mean portion of Salt and Earth is mixed, as may be conjectured, both by the sourness of the Liquor remaining of the Butter, or the Butter-Milk, and by its thicker consistency. In this mixture, the parts both Saline and Sulphureous are in motion, and a Flux: but as the Liquor is thicker they cannot presently fly away: wherefore it remains, that if the bond of the mixture be further loosned, they will separate into parts, and that first the Sulphureous Particles, which exceed the others in power, are Congregated together with a mutual embrace; wherefore these two things, the Chur-

Churning of the Cream performs, *viz.* it brings the Sulphureous parts by their often obvolution together, whereby they do the better intangle themſelves, and mutually enſnare one another; beſides it breaks their mixture with the reſt. For this reaſon, in the Winter time, (when Cream is thinner, and abounds leſs with Sulphur) Butter is hardly made. Beſides the admixtion of Salt or Sugar wholly hinders its making; becauſe by the coming between of thoſe little Bodies, the Sulphureous parts are hindred, from a mutual adheſion.

The chief Precipitation of the blood, which is performed within a living Body, is made in the Reins; where, not without the ſtrength of a certain Coagulum or Rennet, the ſerous matter is ſeparated from the reſt of the blood; juſt as Whey from Milk: For which reaſon Diuretical things are of the ſame Nature, as thoſe which bring a Coagulation to Milk; and therefore, becauſe they more Precipitate the blood by fuſing it, they cauſe a large profuſion of urine. The blood being ſent forth of the Veſſels, ſeparates into various ſubſtances, by its own diſpoſition: whilſt it is warm, it is variouſly Precipitated, by ſome Liquors poured to it, (in like manner Urine) not without a pleaſant Spectacle. If you pour upon warm blood the ſpirit of Wine, Harts Horn, Soot, Vitriol, or other Liquors, chiefly Spirituous or Saline, a wonderful Ebullition, and heat is ſtirred up; whence we may conjecture after what manner it grows turgid, in Feavers. But before the reſt. the Salt of Tartar, and a Solution of Alum, procure both in Blood and in Urin, a great perturbation of the Liquor, and falling down of the parts: for theſe diſturb all the Contents in the pores and paſſages of the Liquor, and by their aſtriction, very much lock them up for a long time.

Precipitation in Artificial things is of greater note and uſe: for this for the moſt part follows Diſſolutions, and ſucceeds them as it were by a certain right of Order; becauſe this takes out of their Jaws, and as it were lays by, the prey, which all *Menſtrua* take by diſſolving. According to the diverſity of the *Menſtruum*, and of the Body diſſolved, Precipitation alſo variouſly happens: but in ſome Subjects there are two chief remarkable things, concerning the manner of Precipitation, to wit, the ſoluted Particles, immerſed in the pores and paſſages of the *Menſtruum*, are wont to fall out of them; either by reaſon of the narrowneſs of the conteining ſpace, or elſe by reaſon of the Contents being increaſed in weight and bigneſs: for in ſome the pores of the Solvent, being either leiſurely bound up, or beſet with a ſtrange Body, ſhut forth from their Cells, the little Bodies of the thing ſoluted, and ſend them to the bottom; as may be obſerved in Sulphureous Solutions, or ſuch as are made of the whole mixture of integral parts, in a thin Liquor; which are diſturbed, and lay away their Contents by external cold, ſimple water, or at leaſt by any Acid infuſion. After this manner reſinous Tinctures, alſo of Sulphur, Olibanum, Benzoin, and the infuſions and decoctions of Vegetables, alſo Urin, Milk, and Blood, are wont to be Precipitated: but in ſeveral others, beſides that the pores, and paſſages of the *Menſtruum*, are either leiſurely drawn together, or poſſeſſed by a new gueſt, alſo ſomthing new grows to the Particles of the thing ſoluted from the Precipitating matter, whereby being increaſed in weight and bulk, they can be no longer ſuſtained; but that they are neceſſitated to ſink to the bottom. This is chiefly ſeen in the Saline Solutions of Minerals, which are only Precipitated by the Salts; whoſe Particles preſently cleave to the little Bodies of the thing ſoluted, and increaſe their ſubſtance, that preſently they deſcend to the bottom by their own weight: For in Saline ſolutions, the little Bodies of the thing ſoluted, are ſtrictly bound together by the fluid *Menſtruum*, with the Saline Particles; and the Particles run haſtily and are heaped together into the Embraces of the ſame fluid Salt, from the Precipitating infuſion of the fixed Salt: wherefore, when theſe three, (to wit, the little Bodies of either Salt, and of the ſoluted matter) do cohere together, they conſtitute greater grains than can be contained in the narrow ſpaces of the *Menſtruum*, and therefore being thruſt out, they fall down towards the bottom: That this does truly happen after this manner, the great affinity, both of the fluid and fixed Salt, is a ſign; that the Particles of both being placed near or mixed together, are preſently combined in one: alſo, becauſe many ſolutions of Minerals, are preſently Precipitated by a fixed Salt, but not by Vitriol or Alum being put in, which do much more bind, and ſtop up the pores of the Liquor. Thirdly, it appears clearly even to ſenſe, becauſe that the matter put for a Precipitate, far exceeds the thing ſoluted in bulk and weight, and is impregnated by the fixed Salt adhering to it, But theſe being thus diſpoſed, we will deſcend to the particular caſes of Percipitations, foraſmuch as Precipitation is made manifold, to wit, according to the diverſity of the *Menſtruum*, of the ſoluted matter, and the Precipitating infuſion.

Simple

Simple water, though it do not well ſuſtain the Particles of the mixture which it receives into it ſelf by infuſion, or Coheſion, yet hardly ſends them away by Precipitation. For the pores of this *Menſtruum* are too open and looſe, wherefore the Precipitating matter, doth not eaſily ſtrike the little Bodies of the thing ſoluted: in the mean time, by reaſon of the more looſe frame of the *Menſtruum*, ſome parts of the ſoluted Body ſink down; others of their own accord evaporate, from whence that Liquor doth not long keep the Virtues or Tincture, with which they are impregnated by another. As ſome more thick parts and Terreſtrial may be thruſt down to the bottom, or otherways ſeparated, we put in the Juice of Limons, or ſome acid thing, or boil in it the whites of Eggs, to wit, that whatſoever is thick might cleave to their viſcous ſubſtance.

Spirituous and Sulphureous *Menſtrua*, being impregnated with the Sulphureous Particles of the thing ſoluted, eaſily lay by their burthen; for they are Precipitated by common, or any Diſtilled water; as is ſeen in Sulphureous and Reſinous Tinctures of Sulphur, Scammony, Benzoin, Frankincenſe, and others of that kind prepared by the Spirit of Wine, or Oyl of Turpentine, which preſently grow Milky, by Water or Phlegm being infuſed. For in theſe ſort of ſolutions, the pores are wholly poſſeſſed, that they admit nothing beſides the thing ſoluted, and beſides, both the Liquor, and ſoluted Matter are ſo thin, that they eaſily give place to any thing elſe being infuſed.

When *Menſtruas* of this kind are filled with Saline Particles, as we may obſerve in the Tinctures of the Salt of Corrals, of Tartar and ſuch like, Precipitation does not preſently ſucceed from common water, but from an Acid Liquor, as the Spirit of Vitriol, Salt, *&c.*

Saline *Menſtruas* impregnated by the ſolutions of Stones or Metals, are moſt eaſily Precipitated by Saline Particles, and ſcarce by others. The chief Precipitatory Liquor, is the Salt of Tartar, or of Herbs burnt to Aſhes, deliquated or melted; for this ſtrikes back the Particles of every ſoluted thing whatſoever, and ſends them headlong to the bottom; to wit, foraſmuch, as it paſſes through every where, the little ſpaces of the ſolvent, and ſticking to the Contents, increaſes them in bulk, that they more eaſily fall out of the pores of the *Menſtruum*, bound alſo together with their own weight.

What fluid Salt (as Vinegar, Stygian waters, *&c.*) diſſolves, the ſame a fixed Salt precipitates; and on the contrary: becauſe Salt of Tartar being melted, moſt excellently penetrates common Sulphur, and receives the Tincture; which then is precipitated by a fluid Salt, *viz.* by the Spirit of Vitriol, and the like: which indeed does not happen, by reaſon of the diſagreeing Particles of the Salts, and mutually oppoſing one another; but for that the ſame are greatly of kin, and ruſh into mutual Embraces: for from hence, the little grains of the thing ſoluted, by reaſon of the cohering of both the Salts together, being increaſed in bulk and weight, are more readily thruſt out of the little ſpaces of the *Menſtruum*, and deſcend to the bottom. We will in this place, more ſparingly inſiſt upon inſtances of this nature, becauſe the more full handling of them belongs to the Chymical Work.

Precipitation is not only obſerved in the ſeparation of a more thick matter, from a ſerous *latex*, and in the ſettling of the diſturbed parts towards the bottom; but ſomtimes the Particles ſhut up within the pores and paſſages of the Liquor, are ſo ſmall and ſubtil, that being Precipitated, they are not diſcerned by the ſight, neither do they quickly deſcend to the bottom; but from their ſituation and poſition, being variouſly changed, the colour, and conſiſtency of the Liquor, are diverſly altered. I was wont in times paſt, to ſport with the ſolutions of Vegetables and Minerals, which being made by themſelves, were clear like Spring water, and appeared bright, being commixed, ſhewed now a Black colour, now a Milky, Red, Green, Blue, or ſome other kind. The ſolution of Saturn, (or Lead) being made with diſtilled Vinegar, appears bright like common water, if you add to this Oil of Tartar, like clear water, the mixture ſtraight grows White like Milk. If Antimony calcined with Nitre, be boiled in Spring water, the ſtraining ſeems clear, and almoſt without ſmell, which yet being daſhed by any Acid thing, preſently acquires a deep yellow colour, with a moſt wicked ſtink. Common water being imbued by an infuſion of Mercury Sublimate, is preſently tinged with yellowneſs, by Oyl of Tartar dropped into it. Quickſilver and Sal Armoniack, being beaten together, and Sublimated in a Matrace by the heat of Sand, go into a white powder, this being ſoluted by melting ſhows like to clear Spring water,

water, which yet being ſmeared upon Braſs or Copper, appears like Silver; and being lightly rubbed on braſen Veſſels, renders them as if they were perfectly ſilvered. A ſolution of Calcined Tin, being put to melted Salt of Tartar becomes bluiſh. A clear infuſion of Galls, being mixt with a ſolution of Vitriol, makes Ink; if you add to this Spirit of Vitriol, or Stygian water, the black Liquor is by and by made clear like Spring water; and this Oil of Tartar reduces again to Ink. And what is more wonderful, if you write on Paper with the clear infuſion of Vitriol, and frame any Letters; what you ſo write preſently vaniſhes, nor is there any marks of the Characters left: but if you ſmear over the Paper with an infuſion of Galls, preſently the Letters may be read, as if wrote with Ink; which yet, with a Pen run over, dipt in Spirit of Vitriol, you may put quite out at once wetting, and then again render them, with wetting them with another Liquor of Tartar. The Sky-colour Tincture of Violets, being daſhed with Oil of Vitriol, becomes of a Purple colour: to which, if you add ſome drops of the Spirit of Harts Horn, that Purple colour is changed into Green. Braſil Wood, being infuſed in common water, leaves a very pleaſant Tincture, like to Claret Wine; if you pour to this a little diſtilled Vinegar, the Liquor appears clear like White Wine: a few drops of Oil of Tartar reduces it to a deep Purple colour: then if the Spirit of Vitriol be poured in, it becomes of a pale yellow, like to Sack; if you add the Salt of Lead, being ſoluted by deliquation, the mixture grows preſently Milky: by this means you may imitate that famous Water drinker, who having ſwallowed down a great deal of Spring water, was wont to vomit forth into Glaſſes placed before him, diverſly coloured Liquors, reſembling the ideas of divers kinds of Wines: for Glaſſes being medicated with the aforeſaid Tinctures, (ſo lightly that they may not be perceived by the ſtanders by) will not only cauſe the water poured into them, to imitate every Wine, but will exhibit the very Proteus himſelf of the Poets, changed into waters, and from thence putting on all colours, and infinite forms.

If a Reaſon of theſe kind of appearances be asked, it ought to be ſought in the minute Particles, contained within the pores of every Liquor; which as to their ſite and poſition, being diverſly altered, by another Liquor infuſed, tranſmit variouſly the Rays of Light, many ways break or reflect them, and ſo make divers appearances of colours. For when the Rays of Light paſs through almoſt in right Lines, they make a clear colour like Spring water; but if in their paſſage, they be a little broken, the Liquor grows yellowiſh; but being more refracted, they cauſe a red colour; if they are bowed back, ſo as to be drained, or that they cannot ſhew themſelves, a dark or black colour ariſes; but if they are again reflected, to the outmoſt Superficies of the Liquor, they create the image of Whiteneſs: after this manner we might variouſly Philoſophiſe about other colours, and their appearances, the diverſity of which, and ſudden alterations in Liquids, depend chiefly on Precipitation: becauſe, as the Particles conteined in the Liquor, are driven ſomtimes more near by another infuſion that they claſp themſelves together; ſomtimes are ordered into other ſeries of poſitions, the diverſe repreſentation of colours is made. For Liquor being impregnated with little Bodies or Atoms, or this Nature, moſt minutely broken, ſeems as an Army of Soldiers placed in their Ranks, who now draw into cloſe Order, now open their Files and Ranks, now turn to the left, now to the right hand, as is diverſly ſhown in the exerciſing of Tacticks, or the Art Military. When two clear Liquors being mixed together ſhall make Ink, it is becauſe the Particles conteined in either, approach near one another, and as it were placed in their cloſe Orders hinder the paſſage of the beams of light: when afterwards, this Ink is made clear by another Liquor poured in, it is becauſe the new Bodies of the thing put in, diſperſe abroad the former cloſe joyned Particles, and drive them as it were into their open Orders.

Chap.

Chap. XII.

Of the motion of Fermentation, as it is to be obſerved in the Coagulation, and the Congelation of Bodies.

Coagulation and Congelation of Natural Bodies, no leſs than their Solution, depend only on theſe our Principles. The improportionate mixture of theſe, and the exaltation, and powerfulneſs of ſome above others, are the cauſe of either. Spirit and Sulphur being looſned from the bond, do not only pull aſſunder the proper Subjects, but they ſet upon whatever is next them; and where they are mighty in number and ſtrength, they affect nothing more than divorces and ſeparations from the reſt of the Principles,and ſuffer no delay: but on the contrary,Salts love to be united to the reſt, and to be made into hard and ſolid ſubſtances; and being deſtitute of the Company of the reſt, preſently to enter into new Friendſhips, and deſire only not to be joyned to any oppoſite. If at any time they are more impetuouſly moved, either by their own diſpoſition, or being ſoluted, they deſtroy the ſubſtance of others, this thing ſeems to be done for this end, deſtinated as it were by Nature, that they might find out Subjects agreeable to themſelves, and having through War obtained Peace, they might at length be more ſtrictly united to them: wherefore when Saline *Menſtruums* corrode Stones or Metals, they are Coagulated with their Particles, and grow together into diverſly figured Cryſtals.

When we here treat of Coagulation, we do not take this word after the uſual manner: to wit, as it is wont to be vulgarly uſurped,when Milk is become congealed, that is,departs from its ſimple and equal Liquor into Heterogeneous ſubſtances, *viz.* Cheeſe, or Curds and Whey, or thick and thin; in like manner, when blood or other humors go into parts after that manner, they are ſaid to be coagulated: alſo, we have elſewhere given this ſenſe, to this word, tho to ſpeak properly, theſe ſort of motions ought rather to be referred to Precipitation than to Coagulation. But here we would have to be underſtood, by the term Coagulation, an alteration in Bodies of the ſame kind, as when things at firſt tender and ſoft, grow hard, into a ſtiff, and as it were ſtony matter: or any thing is ſaid to coagulate, when Saline little Bodies being diſperſed abroad in any Subject, begin to be congregated and joyned together, and from thence united, either among themſelves or with Earth, produce out of a ſoft and fluid ſubſtance, a hard and compacted. This may be perceived in the ſhells clearly ſtony, of Fruits and Seed; in Bones and Horns of living Creatures, in Shells and Shelly ſcurffs of Fiſhes; all which indeed very much abound with an Alcali Salt, or the ſame Volatilized. Among Handicrafts, or preparations from human Induſtry, the Cryſtaliſation, Vitrification of Salts, or making of Glaſs, alſo the baking of Pots and Earthen ware, ought to be referred to Coagulation.

But it is properly called Congelation, when the Saline Particles, coming from elſewhere, ſtrictkly bind together the Subjects on which they fall, fix the Particles variouſly moved within the ſubſtance of the mixture, and gather them together, that by that means the whole becomes ſtiff, and as it were ſtony. We may behold theſe kind of effects in Ice and Froſt, by which ſoft Mud, or fluid Springs of waters grow ſtiff, into a very Marble ſubſtance. Alſo the ſame is manifeſtly beheld, among the Operations of Art, in the confuſions of ſome Salts, and mutual Concretion in Sublimating; by which means, they go into a ſubſtance, now like to Ice, now to Snow. To which may be added the Artificial turning of water to Ice, which is performed by the mixture of Salt and Snow; but the inſtances which we have remarked in either of theſe, about the Works of Art, we will in this place briefly run through, and a little conſider the reaſons of them, and the ways of being done.

The Cryſtaliſation of Salts, is procured after this manner; Salts of every kind are throughly diſſolved in common water, and their Particles being diſperſed through the whole maſs of the Liquor, wholly diſappear; afterwards, if this liquor be ſomwhat

evaporated, that its paſſages and pores be ſomthing bound together, the little Bodies of the Salt cloſe one with another, and mutually take hold of themſelves, and joyn together, the outward cold binding them, and are figured in the midſt of the water, into Cryſtals proper to their Nature. By this means *Sal* Nitre into Pyramids, Sea Salt into Cubes, Alum into eight cornered Figures, *Sal* Armoniack into ſix cornered, and other Salts are formed into other Figures of their own accord, after a conſtant manner.

If the Reaſon of this be ſought after, we ſay that theſe kind of Salts are not ſimple Elements, but Bodies made up of abundance of Salt, with the other Elements mixed with them in ſmall quantity; which even as other Natural Concretes, are allotted by the firſt Creator, peculiar manners of figurations, according to the ſurpaſſing ſtrength of Salt and Spirit, and commixion with the reſt. For in determining the Figures of Natural Bodies, Spirit and Salt are as the Rule and Compaſs in deſcribing Mathematical Figures: Spirit, as the moveable Foot of the Compaſs, or as a Penſil in the hand of an Artiſt, variouſly excurs and draws here and there diverſe faſhioned lineaments. But ſalt (as the applyed Rule) moderates the excurſions of the other, and determinates them, and reſtrains them within the confines deſigned by Nature: when the Spirit is more powerful than the Salt, there happens a greater variety in the Figuration of things, as in Vegetables and Animals; becauſe the Spirit running forth more largely, forms very many Marks of its Pourtracture, and deſcribes Bodies not in right Lines, but intorted, and very much variegated. Where the Salt Lords it over the Spirit, as in Mineral Concretes, and chiefly Saline; Bodies grow together in leſs adorned Figures, and are accounted the firſt and more ſimple, and of that ſort, as the Mathematical deſcriptions in right Lines or Circles. For thoſe Salts, are as it were ſecond Elements; and from the implanting of them in Bodies, the proper and native Figures of things, very much depend; and therefore they themſelves are primitively imbued by Nature with a certain Elementary Configuration, (ſo that according to *Plato*, God in truth exerciſes Geometry) and the firſt regular Figures are formed in the more ſimple, that things compounded of them, might ariſe furniſhed with all manner of variety of figures.

The fixed Salts of Herbs being prepared by Calcination, becauſe they are almoſt deſtitute of the Fellowſhip of Spirits, do ſcarce go at all into Cryſtals, nor are they coagulated, but by a long evaporation. Sea Salt containing a very little Spirit, with great Labour goes into Cubes. Next to this Alum, guifted with a little more Spirit, is more eaſily coagulated, and grows into more elaborate Figures, *viz.* eight cornered. *Sal* Nitre, ſwelling with ſpirit, is moſt eaſily coagulated, and is framed into a more perfect Figure, *viz.* Pyramidical; which conſiſts of both Spherical, and Right Lines. But Volatile Salt, (ſuch as is diſtilled out of Urine, Blood, and the Horns of living Creatures) being aſſociated with a plentiful Spirit, is drawn into Concretes, very much varying, which imitate now the Horns of Staggs, now the Figures of Plants. Out of Mercury, with Salt, or the Calx of Silver, by an Amalgama, in the midſt of the waters a Silver Tree is formed, with Stock, Trunk and Branches, painted to the Life. It is a uſual thing in the Winter time, for the Air, impregnated with Saline Vapors, and fallen on the Glaſs Windows, to be condenſed into moſt fair Figures of Trees and Woods. So much for the Cryſtalliſation of Salts: The other Species of Coagulation, is Vitrification, of which we will ſpeak next.

Vitrification (which is alſo ſaid to be the laſt mutation of Bodies, of which Nature is capable, and from which there is no going back) depends upon a fuſed Salt, and united to an Earthy matter, even to its ſmalleſt Particle: for when either matter is fuſed, by a moſt vehement fire, and divided in its ſmalleſt parts, the Bodies of either, being put into a Flux, are by ſo ſtrict a marriage joyned together, that afterwards they are never to be pulled aſſunder.

There are many ways, and diverſe proviſions of Vitrification, to wit, of *Sal Alcali*, with Sand or a ſandy matter fuſed together by a violent fire, common Glaſs is made; which is tranſparent, both by reaſon of the abundance of Salt, and of the clearneſs of the Sand; for if you behold the little Sands of which Glaſs is made, with a Microſcope, each of their little Globes appear, (as they were Glaſſie Gems) clear and ſhining. Wherefore Salt promotes the fuſion of that clear matter by fire, and then is admitted into its moſt ſtrict embraces being fuſed.

Beſides Glaſſes of diverſe Colours and Conſiſtences are made of Minium, the Calx of Tinn, Antimony, and ſome other Minerals, (when the Sulphureous part doth firſt

fly

fly away) fuſed, now by themſelves, now with Flint or Sandy matter. The reaſon of all which conſiſts in this; that Salt and Earth, being moſt ſmally broken by a violent fuſion of fire, and being divided as to their leaſt Particles, catch hold of one another, and ſo are bound together, by the moſt ſtrict bond of the mixture. The Coalition or Coupling of theſe, is never to be diſſolved, becauſe there is wanting within in the mixture, other Principles, which might unlock the frame of the Subject: yea Salt and Earth, being joyned by the mediating fire, do ſo intimately cohere, that they affect not divorces of themſelves, nor ſuffer them from another.

The baking of Earthen Pots and Bricks, is of kin to Vitrification (or making of Glaſs) whereby moiſt and ſoft Clay is ſtifned into a very ſtony hardneſs: But in theſe, there is greater plenty of Earth, and leſs of Salt; wherefore they are leſs brittle, and not tranſparent. Concerning theſe we ſay, that by the fire mediating, and as it were handying the ſmalleſt, broken, and divided Particles of Salt, are married to every Particle of the Earthy matter, and with them grow hard, into as it were a ſtony ſubſtance, and that not eaſily to be reſolved. Alſo in theſe kind of matters, prepared by human Induſtry, we imitate indeed, with an excellent Artifice, the Concretions of Bones and Stones, made by Nature in divers Families of Animals, Vegetables, and Minerals.

As to what reſpects Congelation; Salts of a diverſe kind, do often meet together, and grow ſtiff, into as it were a new ſubſtance: But this happens many ways. Of theſe, ſome Salts being mixed together, preſently grow together into Cryſtals: for the Acid Spirits of Minerals being added to the Salts of Tartar, or thoſe made of the incineration of Vegetables turn into a white Coagulum like Snow, and with a ſpumeous or frothy Heat: The reaſon of which is, that the Particles of the Salt, having gotten a Flux, take hold of other Salts in the Spirit, Alcaliſate by melting; but by reaſon of the firſt Particles of either, being made unlike, there ariſes a ſtrife; then from the ſame conſociated in one, that white ſettlement is made.

Not unlike the ſame manner, theſe Acetous Spirits, to wit, of Vitriol, Nitre, Salt, and others being mixed with Metals, while they corrode them, are Cryſtalliſed together with their Saline Particles: ſo the Spirits of Vitriol, Nitre, alſo Stygian waters, (which are only Salts having gotten a Flux) are formed into moſt elegant Cryſtals, in the diſſolving of Silver, Iron, Copper, and other things. For Salts, even as Sulphur, being looſned from the mixture, diſſolve other mixtures, and greedily deſire to be united with the Homogeneous Particles of the ſame Subject.

There is another manner of Congelation, when Salts being mixed with ſome other matter, are elevated by Sublimation out of their Subjects, and then congeal the Particles of that new matter, which they carry away with them, and grow together with them (like a Meteor) on high: after this manner the Salts of Vitriol, Nitre and Sea-Salt, being ſublimated with Mercury, are congealed as it were into a ſnowy ſubſtance: The ſame being ſublimed with Antimony, go into a matter like Ice. After this manner the Natural Congelations, by which ſome Minerals, and chiefly Vitriols and Sulphurs, are begot in the Bowels of the Earth, may be imitated. For of Iron and Copper are prepared factitious Vitriols, which are very like the Natural: Of Antimony Sulphur is made, which anſwers to an hair our common Sulphur in taking fire, colour and ſmell: for example pour Oyl of Vitriol, to the height of a fingers breadth, upon pulveriſed Antimony; and let it be diſtilled in a Retort in a Sand Furnace, a yellow Sulphur will be ſublimed in the Neck of the Retort, that cannot be diſcerned from the common Sulphur: which is a ſign that the Concretion of Sulphur is made in the Earth, when ſome Sulphureous Mineral is corroded by the Salt of Vitriol, whoſe Sulphureous parts are congealed by the ſame Salt. This alſo is an Argument, that Oyl of Sulphur, which is ſeparated, by inkindling under a Bell from the Sulphureous matter, is nothing elſe but Vitriolic Salt, nor doth any thing differ from Oyl of Vitriol.

Artificial Congelation concludes inſtances and examples of Congelations: to wit, whereby common water, or any Liquors being put over the fire, or in an Hot Houſe, are ſuddenly congealed into Ice: 'tis a common way, and vulgarly known, Salt being mixed with Snow and Ice, and agitated or ſhaken in a Veſſel put into water, ſuddenly the water about the ſides of the Veſſel will be frozen. This will be done if you make tryal of it, either with common Salt, or Sea-Salt, Nitre, or alſo with Vitriol, Alum, *Sal* Armoniac, or Mercury Sublimate: For Salt of every kind, being put to Snow or Ice, looſens their mixtures, and ſends away the Nitrous and Congela-

lative Particles from the Subjects; which presently being immersed in the neighbouring water, Congeal it, as if they were freshly blown from the North.

What is more admirable; let a dish with Snow be placed over hot Coals, and in the middle of the Snow put a Glass full of water: as the Snow is melted by degrees by the fire, the water shall be frozen: for the Nitrous Particles, being driven away by the heat, by their departure, they are dashed against the neighbouring water and congeal it.

And thus much for FERMENTATION in general, and briefly of its various parts; it had been almost an infinite Labour, and from our purpose, to heap up instances in so diffuse a thing. Those hitherto brought, however chosen out of Natural Philosophy, were fit to wait upon the following Medical dissertation, that we may more happily know the Original, Progress, and State, as also the Remedies and Cure of Motions, and Mutations, in Causes, which variously happen to all kind of Bodies, and somwhat respecting the Tumults, which from thence are begot in the human Body, from the blood being irritated, and the rest of the humors; to which exercise, God willing, we will now proceed.

FINIS.

THE PREFACE.

To the Friendly Reader,

TO Inſtitute in this *Age* a new Doctrine of Feavers, may perhaps ſeem the ſame thing, as if any one ſhould go about to deſcribe the midſt of our Country, for a Land before unknown. For what reſpect the Diagnoſis of this Diſeaſe, ſeem to be firmly Eſtabliſhed already, by the Precepts and Practice of the Antients and Moderns; yea by long Experience, they are ſo generally in the mouth, and known of all men, that nothing can be more. However I deſerve pardon, if I a little receed from the Vulgar Opinion concerning Feavers, as a way mightily worn out; and go in a leſs trodden Path; becauſe I am not the firſt, or only man that directs his courſe againſt the received Opinion, as againſt a Stream. For in truth, in the Medical Art, (and that deſervedly) thoſe things have not pleaſed the men of our Age, which did thoſe of the former: becauſe the Antients relying on a falſe Poſition concerning the motion of the Blood, proceeding as it were through ſlippery and moiſt places, often fell foully and dangerouſly: wherefore it is no wonder, if thoſe who come after ſhould take care for the thorough inſtauration of Phyſick, and for the Re-Edifying the Building, (as they ſay) even from the ground, the Antient Props being fallen down, on that which our moſt Famous Harvy hath laid, the Circulation of the Blood, as a new Foundation in Medicine. But in this Work, Learned men of other Countrys, but chiefly of our own, have happily laboured, not only in removing the Rubbiſh of the former Building, but for the ſupplying this plentifully with Stone, Planks, and other matter. In times paſt, among the Antients, as the diſtribution and Natural motion, of the Nutritious humor, of the Blood and Nervous juice; ſo the Feaveriſh heats, and preternatural motions of them, were wholly hidden and lay in the dark: but now new Lights have ſhined forth, and it is granted us to know the Cauſes of things before hidden, it doth not become prudent men, and profeſſing Philoſophy, even to ſhut their Eyes and remain blind in the Light it ſelf; but eſpecially about a Diſeaſe by

by which the third part of Mortals have ſtill fallen to this day, to be rather willing to Err with the Antients, than to underſtand the Truth with the Moderns, or to believe what is more likely, argues a mind guilty of notable ſtubbornneſs. When therefore the Puretology or Feaver Tracts of former Medicine, had no firm and ſtable Baſis, and that it is eaſie to ſhew that it was built upon very many, and plainly falſe Errors, what ſhould hinder, but that we having gotten more certain Principles, ſhould endeavour to erect a better Science concerning Feavers? Truly I think it would hardly be, altho the pleas of the Antients, ſhould be yet openly maintained in the Schools, but that many Phyſitians, who have a mind to look within the Bark, would frame new Hypotheſes to themſelves from their own Ratiocination, by which they might more exactly quadrate the Phænomena of Feavers, than by that of the Antients. But it may be objected, that Feavers have been happily cured by the ſame Remedies, and the like method of Curing, from the times of Hippocrates *and* Galen, *even to our days; and therefore it may ſeem a raſh Work and little ſafe, that we ſhould endeavour new things, after having had the Experience of ſo many Ages, eſpecially ſince it is about the human Body. To this it will be eaſie to anſwer, that Medicine was at firſt Empirical, and Remedies were not invented by general Precepts, or by Rule, but by the frequent trial of ſeveral things: And if led by the Example of* Hippocrates, *his Followers had only poliſhed his Obſervations and Experiments, without doubt the Medicinal Art had grown up better, more handſomly, and with greater benefit to the Sick. But that the Light, clearly inkindled by the Antients, did ſo ſuddenly ſhut up, and darkned the Eyes of Poſterity, it was, the prepoſterous ſtudy of thoſe, who too haſtily framed, almoſt out of their own Brain, Phyſick into a general Method, after the manner of ſome Speculative Science: for by this means, before they had laid a firm Foundation, a ſufficiently ſpecious, and deceitful Pile of unſtable Doctrine, was erected. That therefore in the Cure of Feavers, ſome Indications being more antiently received, remain yet confirmed, and are to be perpetually obſerved, is to be aſcribed wholly to Experience, the firſt Miſtreſs of this Art, and not to the Precepts of Scholars. And from hence, I hope for my ſelf, to have gotten a defence ſufficient enough; for if the Opinions wholly erronious of the Antients, had not hindered, but that the practice of Medicine, at firſt inſtituted by a certain induction of obſervations; had proceeded commodiouſly enough; the Theory being joyned with Truth, would have brought much leſs hurt to the Sick; or have leſs carried away thoſe exerciſing Medi-*

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cine, quite contrary from that Path, which Antiquity had left commended to us. In the mean time, 'tis not to be dissembled, that naked Experience, without the helps of Method and Reason avails little, yea very often doth much hurt; for neither are the same Diseases, every where to be driven away by the same Remedies. But he seems to have hit the mark, who joyns both together, that Reason may not pervert Experiments, and Nature it self, not that this may remove Reason from its place. Altho that I know well enough, I have not obtained it, yet I will freely profess, that I have aimed at this Mark; and perhaps I may have deserved some praise, even in failing in these sort of Adventures; for after I had not found in Books, what might satisfie a mind desirous of Truth, I resolved with my self, to search into living and breathing Examples: and therefore sitting oftentimes by the Sick, I was wont carefully to search out their Cases, to weigh all the symptoms, and to put them, with exact Diaries of the Diseases, into writing; then diligently to meditate on these, and to compare some with others; and then began to adapt general Notions from particular Events: and when by this means, for a long time, observing the Accidents and Courses of Feavers, I had busied my self, for the finding out forms of Reasons for their Cure, at length a new Pathology of this Disease was conceived in my mind; which afterwards, by the frequent increasing Concourse of Observations, as it were the Juice and Blood, was formed by degrees into a Child, such as it now appears. But the Infant, which I had ordered to be kept closely, in our private house, being remarkable for Paradoxes, as it were a monstrous shape, the importune diligence of Friends has taken care to bring abroad being gotten forth of my hands, and to be publickly beheld. What therefore is there said concerning Feavers, besides the common manner, I would not have any one esteem it brought forth by me, as from a Doctor in the Chair: doubting, I bring these thoughts into Public, and submit them to the Examination and Emendation of the more Learned. That others before me have not spoken all things truly concerning this thing, shall be an Argument that I may Err, yea (if you please) that I have Erred: however, if I should have rightly traced forth any marks, in this, at least new search of Truth; and shall have incited others (who are far better able) by this occasion, to the full finishing of it; it will not repent me altogether of this, tho rash beginning.

OF

OF

FEAVERS.

CHAP. I.

The Anatomy of the Blood; and its Resolution into five Principles: A comparing it with Wine and Milk.

THE Doctrine of Fermentation being explicated, it remains that we handle the chief Instance or Example of it, to wit *Feavers*. For it seems that a Feaver is only a Fermentation, or immoderate Heat, brought into the blood and humors. Its name is derived from *Februo* (or *Purgament*, which also is derived from *Ferveo* to be Hot) which word indeed is commodiously put to every Feaver, for that the blood in this Disease grows hot, and besides, by its fervor, as working must, it is Purged from its filthinesses. But that this Fermentation or Feaverish effervescency, may be rightly explicated, these three things are to be considered. First, What the Fermenting Liquor is; whether only blood, or any humors besides. Secondly, In what Principles in the mixture, and in what proportion of them, this Liquor consists. Thirdly and lastly, By what motion and turgescency of those parts, or Particles, of which the blood is made, the Feaverish effervescency is stirred up. These being thus premised, the Doctrin of Feavers shall be delivered, not from the Opinions of others, but acccording to the comparisons of Reasons, picked (tho from ours, yet) from diligent and frequent observation, and confirmed by certain Experiments; all which however, I willingly submit to the judgment of the more skilful.

It plainly appears, even to the sense, that the Blood doth hugely boil up and rage in a Feaver, for every one (tho rude and unskilful) being in a Feaver, complains of the blood being distempered, and of the same growing hot in the Vessels, and as it were put into a fury. Also, besides the blood raging in the Veins and Arteries, it may be lawfully suspected, that that juice with which the Brain and Nervous parts are watered, is wont oftentimes to be in fault; for when this Liquor is seen to be carried back from the blood, into the Nervous stock by a constant motion, and certain Circulation, and from thence through the Lymphatick Vessels, into the Bosom of the blood, it is probable, if by reason of a taint contracted from the blood, that humor be depraved in its disposition, or is perverted from its equal motion, that from thence, the Rigor, and Pain, Convulsion, Delirium, Phrensie, and many more symptoms of the Nervous kind, usual in Feavers, do arise.

After the Blood and Nervous Liquor, two other humors, for that being apt to grow hot, fall into our consideration, *viz.* The Chyme or nourishing Juice, continually coming to the Mass of Blood, and the serous Latex, perpetually departing from the same, which tho they be the first and last Liquors separated from the Blood, and distinct from it, yet being confused with it, they ought to be esteemed as its associate parts, or complements: For the nourishable Juice being fresh brought, is accounted the crude part of the blood, and to be assimilated; and the *Serum*, its stale part, and to be carried away. And after this manner, so long as either are Circulated with the

blood it ſelf, in the Veſſels they participate of the heats of the firſt begotten blood, and oftentimes occaſionally begin them, or increaſe them being begun: but by what means theſe things come to be done, is declared hereafter in their proper places. As to the reſt of humors, which are only the recrements of the Nutritious juice, or the blood, when they are included, either in their proper Receptacles, or conſtrained in the narrow ſpaces, in the Viſcera, neither waſh the ſeveral parts of the Body with a continual luſtration, as the blood or Nervous Liquor, or the other humors but now recited, are to be exempted from this rank; ſomtimes perhaps they may be the occaſional cauſe that the blood doth conceive an undue Effervescency, or that it perſiſts in it longer; but it is only the blood, (with the Nervous Liquor, the alible juice, and *Serum* aſſociates) which boiling up above meaſure, with its heat, and ſtirred up with a rage through the Veſſels, diffuſes the preternatural heat, and induces the formal reaſon of the Feaver: but how this comes to be done, is not to be known plainly, but by a more near beholding the Nature of Blood, and as it were an Anatomy made of its Liquor.

There are in the Blood (as in all Fermentative Liquors) Heterogeneous Particles which as they are of a diverſe Figure and Energy, remain a long while in the mixture, by their mutual oppoſing one another and ſubaction, the motion of Fermentation is continually conſerved; as is perceived in Wine, Beer, and other Liquors: then, if the mixtion of the Liquor be ſomwhat unlocked by the adding of Ferments, the Native Particles being freed from their bonds, do yet more ſwell up, and induce Fermentation, with a more rapid motion and heat: which is ſeen in a familiar Experiment of the Chymiſts, *viz.* when fluid Salts are mixed with Saline Liquors of another kind; from thence a great heat and ebullition are ſtirred up. Wherefore we ought to inquire concerning the Blood, of what Particles it conſiſts, that it ſhould be fit to Ferment, (as Wine, Beer, and other Liquors) of its own Nature: then by the help of what kind of Ferments, both its Natural and Feaveriſh heats are performed, with warmth, and a more quick motion.

The Maſs of the Blood by the opinion of the Antients, was thought to conſiſt of four humors, to wit, Blood, Phlegm, Choler and Melancholy: and it was affirmed, that according to the eminency of this, or that humor, diverſe temperaments are formed; and that by reaſon of their fervors or exorbitances, almoſt all Diſeaſes do ariſe. This Opinion, tho it flouriſhed from the time of *Galen*, in the Schools of Phyſicians, yet in our Age, in which the Circular motion of the Blood, and other affections of it were made known, before not underſtood, it began to be a little ſuſpected; nor to be ſo generally made uſe of, for the ſolving the Phænomenas of Diſeaſes: becauſe theſe ſort of humors do not conſtitute the blood, but what are ſo called (except the Blood) are only the recrements of the blood, which ought continually to be ſeparated from it: For in truth the Blood is an only humor; not one thing about the Viſcera, and another in the habit of the Body; nor is it moved at one time by Phlegm, and another time with Choler, or Melancholy, (as is commonly aſſerted) but the Liquor growing hot in the Veſſels, is only Blood, and whereſoever it is carried through all the parts of the Body, it is ſtill the ſame, and like it ſelf. But becauſe by reaſon of the abundance of the implanted heat in ſome, and becauſe of the ſmalneſs of it in others, the Coction of the Aliment is now quicker, now ſlower performed in the Bowels, and in the Veſſels; therefore the temper of the Blood (tho but one, and always the ſame Liquor) becomes diverſe: and according to the various diſpoſition of this, it may be ſaid that men are Choleric, Melancholic, or of another temperament. Beſides, becauſe whilſt the Blood is made in its Circulation in the Veſſels, ſome parts continually grow Old, and others are ſupplied anew, hence from Crudity, or too much Coction, there is a neceſſity that what is excrementitious ſhould be heaped together: which notwithſtanding by its effervescency, (as by the working or depuration of Wines it comes to paſs) it is ſeparated from its Maſs, *viz.* the watry humor, fixed in the Bowels, or ſolid parts, is it which is called Phlegm: ſome Reliques of aduſt Salt and Sulphur, being ſeparated in the Liver, and received by the Choleduct Veſſels are called Choler; the Earthy feculences being laid up in the Spleen, are termed Melancholy. In the mean time, the Blood if rightly purified ought to want Choler, Phlegm and Melancholy: even as when ſome Wines, or Beer are purified, the more light Particles are carried upwards, which conſtitute its Flowers or Head; and the dregs are preſt down to the bottom, which grow together into Feces or Tartar: yet none can truly ſay it, Wine or Beer is compoſed of Froth, Tartar, and a Vinous Li-

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quor. But as theſe humors, commonly ſo called, are made out of the other Principles, *viz.* Choler out of Salt and Sulphur, with an admixtion of Spirit and Water; and Melancholy, out of the ſame, with an addition of Earth; and as the blood is immediately forged out of theſe kind of Principles, and is wont to be reſolved ſenſibly into the ſame, I thought beſt, the common acception of humors being laid aſide, to bring into uſe theſe celebrated Principles of the Chymiſts, for the unfolding the Nature of the Blood and its affections. There are therefore in the blood as in all Liquors, apt to be Fermented, very much of Water and Spirit, a mean of Salt and Sulphur, and a little of Earth. The blood being looſned by putrefaction, exhibits the ſame ſeparated and diſtinct. Alſo in the blood contained in the Veſſels, or being freſh let out from them, we may diſcover their energies and effects: beſides when in the Food, whereby we are fed, by the juice of which the Liquor of the blood is made, theſe ſame are implanted, no man will go about to deny that the blood alſo is made from them: wherefore I will briefly run through theſe, and endeavour to ſhew by what means the Conſiſtency, the Properties, and the Affections of the Blood are made by them.

1. Spirits (which readily obtain the chief place) are a ſubtil, and greatly volatile portion of the blood. Their Particles, always expanſed, and endeavouring to fly away do move about the more thick little Bodies of the reſt, wherewith they are involved, and continually detein them in the motion of Fermentation. The Liquor of the blood, continually boils up with their effervеſcency or growing hot, and equal expanſion in the Veſſels, and the reſt of the Principles are contained in an orderly motion, and within the bond of the exact mixture; if any Heterogeneous thing, or unagreable to the mixture, be poured into the bloody Maſs, preſently the Spirits being diſturbed in their motion rage, ſhake the blood, and force it to grow hugely hot, until what is extraneous, and not miſſible, is either ſubdued, and reduced, or caſt out of doors. By the irradiation, or rather the irrigation or watering of theſe, the Bodies of the Nerves are inflated, the Functions of the Viſcera, and alſo the Offices of motion, and ſenſation are performed: from the want of Spirits, alſo from their motion being depraved or hindred, ariſe great vices of the Natural œconomy or Government. The more quick motion and effervеſcency of theſe in the blood, (above what is in Wine) chiefly depends upon the Ferment of the Heart; becauſe, whilſt the blood paſſes through the Boſom of the Heart, its mixture is very much looſned, ſo that the Spirits, together with the Sulphureous Particles, being ſomwhat looſned, and as it were inkindled into a flame, leap forth, and are much expanded, and from thence they impart by their deflagration, a heat to the whole. By reaſon of this kind of expanſion, and ſuffuſion of heat, there is made a continual expence of Spirits, which being rarified, as it were inkindled, continually fly away, and are evaporated forth a doors: and as long as we live there is made a continual reparation of theſe by aliments, chiefly the moſt delicate; which contain in themſelves very much of Spirit and ſwelling matter: from which juice being drawn by digeſtion, and collated to the blood, is aſſimilated to it and fills up its defects. When the Blood of Animals is diſtilled, the Spirits (like *Aqua Vitæ*) aſcend of a limpid colour, they are made very ſharp and pricking by the adheſion of the Salt; yet they are not ſo eaſily drawn off as the Spirits of Wine, but that there is need of a more intenſe fire to force them, becauſe they are hardly driven from the fellowſhip of the thicker parts, with which they are involved.

2. That there is plenty of Sulphur in the blood, it is plainly ſeen, becauſe we are chiefly fed with Fat and Sulphureous Aliments, alſo the Nutriment from the blood, carried to the ſolid parts, goes into Sulphur and Fatneſs. It is moſt likely, from the diſſolution of this, that the red Tincture of the Blood doth ariſe: for Sulphureous Bodies, before any others, impart to the ſolvent *Menſtruum*, a colour highly full of redneſs; and when by reaſon of too great Crudity, the Sulphur is leſs diſſolved, the blood becomes watery and pale, that it will ſcarce dye a Linnen ragg red. The Maſs of blood being impregnated with Sulphur, and together with Spirits, it becomes very Fermentable: which however, whilſt it enters the Ventricles of the Heart, there ſuffers a greater effervеſcency, or rather accenſion; and on the Particles chiefly Sulphureous, being inflamed; and thence diffuſed through the whole, the lively and vital heat in us depends. When the Sulphureous part is carried forth, and doth too much luxuriate

uriate in the blood, it perverts its diſpoſition from its due ſtate, that therefore the blood being either depraved, or made more bilous or Cholerick, doth not rightly Cook the nouriſhing juice; or being inkindled throughout, it conceives heats and ardours ſuch as ariſe in a continual Feaver. For the Sulphur being too much exalted; and ſwelling more than it ought, ſtirs up great heats in the blood: and they whoſe blood is more plentifully impregnated with Sulphur, are moſt obnoxious to Feavers. By reaſon of the Particles of this being incocted with the Nutritious juice, and from thence carried to the ſolid parts, fatneſs, ſoftneſs and tenderneſs, come to our Body. From the Fleſh or Blood putrefying, by reaſon of the abundance of evaporated Sulphur, a moſt evil ſtink breaths forth: In the diſtillation of Blood, Sulphur aſcends under the form of a blackiſh Oyl, which alſo by reaſon of the Empyreuma, ſtinks moſt wickedly.

3. That Salt is in the blood, is evinced by the Salt; which, tho fixed, is drawn forth, by being eaten, from Vegetables, and from other eatable things, at firſt leſs volatile, afterwards by the moſt excellent digeſtion of Nature, and Circulation, is highly volatiliſed; that it paſſes through, not only without a remaining *Caput Mortuum*, all the members and parts of our Body, but alſo the blood being expoſed to diſtillation, aſcends the Alembic, and leaves the dead Head as inſipid earth: If at any time the Saline Particles are not rightly exalted in the Blood, by reaſon of ill digeſtion, but remain crude, and for the moſt part fixed, from thence the blood becomes thick and unfit for Circulation, ſo that obſtructions are begot in the bowels and ſolid parts, and ſerous Crudities are every where heaped together: But if the Salt be too much carried forth, and ſuffers a Flux, the Spirit being depreſſed, or deficient, a ſour and bitter diſpoſition is given to the blood, ſuch as is obſerved in Scorbutical people, and thoſe ſick of a Quartan Feaver. Alſo from the Salt, for this reaſon being variouſly coagulated, the Stone, Kings-Evil, Gout, Leproſie, and very many other Chronical Diſeaſes ariſe. But when Coction being rightly performed in the bowels and Veſſels, the Salt is duly exalted, and being aſſociated with the Spirit, is volatiliſed, then by reaſon of its mixture, the Liquor of the blood more equally ferments; alſo is defended from Putrefaction, Stagnation and Coagulation: Alſo the Saline Particles, bridle the fierceneſſes of the Spirits, and eſpecially of Sulphur; wherefore, thoſe who have their blood well filled with a Volatile Salt, are leſs obnoxious to Feavers: alſo hence thoſe who often are let blood, are more apt to Feavers.

4. Beſides, There are in the blood (as it is a thick humour, and hath a groſs conſiſtence) many Earthy Particles: from hence alſo, its too great Volatiliſation is as it were ſupported, and its too haſty accenſion hindered: even as Charcoal-duſt, is added oftentimes to Gun-Powder in a greater proportion, that all its parts may not take fire at once, and too ſoon. Further, from the Terreſtrial Particles of the blood, and Nutritious Juice, the bulk and increaſe of the Body proceeds. Laſtly from the diſtillation of the Blood, a light and friable *Caput Mortuum*, is left in great plenty.

5. Upon the watery part of the blood depends its fluidneſs; for from hence its ſtagnation is hindered, and the blood is circulated in the Veſſels, without growing thick or ſtiff: alſo its too great conflagration, and aduſtion is reſtrained, and its heat attempered. When blood is diſtilled a clear and inſipid water is drawn off, at leaſt in a double proportion to the reſt; for from hence the matter of Urine, Sweat, and every humid Excrement, for the moſt part proceeds.

What things were but now aſſerted, concerning the Principles of the blood, and the affections to be deduced thence, will better appear, if we conſider conſider a little the blood according to its ſenſible parts, and ſhall compare it with other Liquors which are in dayly uſe among us. Thoſe ſort of Liquors, which have a very great Analogy with the blood, are *viz.* Rich Wine and Milk. As to the reaſons of Fermentation and growing Hot, it is moſt fitly compared to Wine; as to its conſiſtency, coagulation, and departure of the parts one from another, it is likened to Milk.

In the firſt place therefore, it is obſerved of Wine, that ſo long as it is ſhut up in the Veſſel or Pipe, its ſubtil and ſpirituous Particles, do perpetually agitate, or very much ſhake others more thick, break them, and render them fit for an exact mixtion; what is heterogeneous, and unfit for ſubaction or mingling, is ſeparated by its growing hot: In the mean time the purified Liquor greatly fermenting is in perpetual motion,

tion, whereby all the parts (as Atoms variouſly moved up and down, in a beam or ſtreak of light) do ſtretch themſelves forth onevery ſide, and contend with a conſtant rowling about, from top to bottom, and from thence to the top again. By the attrition and refraction of the Particles very many *Effluvia* of Atoms, go away from the Liquor, which if the Veſſel being cloſely ſhut, they are kept within; the Liquor grows too exceſſively hot, and oftentimes cauſes the containing Veſſel to burſt in pieces. Blood, much after the ſame manner being ſhut up within the Veins and the Arteries, is urged with a conſtant Circulation: The Vital Spirit makes ſubtil, breaks, and exactly molds the more thick Particles; what is heterogeneous, and not mixable, it expels forth of doors; in the mean time by the refraction and kneading of the parts, *Effluvia* of heat do conſtantly ſtream forth, and evaporate through the pores; which being ſhut in, if tranſpiration be hindred, preſently by reaſon of the too great boyling of the blood a Feaver is inkindled.

Secondly, we will obſerve concerning Wines, that they grow turgid, or ſwell up, if any extraneous thing, and of a Fermentative Nature, be poured to them; yea ſomtimes, that they are moved more than ordinary of their own accord. For, when by a long digeſtion, the Sulphureous part of the Wine is too much exalted, it conceives a greater heat than it ought, and (unleſs preſently appeaſed) perverts the diſpoſition of the whole Liquor, with its ſwelling up. It ſeems to be for the very like reaſon, that the Feaveriſh heat which is wont to be introduced by reaſon of the ſame Cauſes, is ſtirred up in the blood, as ſhall be ſhown in the next Chapter, where we treat of the Motion and Heat of the blood.

The third Obſervation, or comparing of the Blood with Wine, ſhall be of this ſort: Wines (as alſo many other Liquors, as for example, Beer, or Sider) have their times of crudity, maturation, and defection. For when they are firſt made, the Spirituous parts are ſo obvolved by the others more thick, that they ſhew themſelves but little, and put forth almoſt nothing of ſtrength or virtue: and as the other Particles, are not yet ſubtiliſed, nor truly concocted, the whole Liquor remains crude, and of an ungrateful taſt; and if put to diſtillation, not any Spirit aſcends. From this ſtate it comes by degrees to perfection, and when the Spirits being extricated from their intanglements, obtain their own right, and have ſubtilized and exalted the more thick Particles of the reſt, the whole maſs of the Liquor becomes Clear, Spirituous, Sweet and Balſamick. Laſtly, when by a long Fermentation, the Spirits are conſumed, and begin at length to fail, the ſtate of defection is induced, whereby Wines, and other Liquors, either paſs into a taſtleſneſs, or at laſt the Salt and the Sulphur being too much exalted, are made ſowr or unſavory. In like manner the blood alſo, while it is Circulated in the Veſſels, may be conſidered according to this kind of threefold diſpoſition: Firſt, in the making or crudity, which has relation to the Chyme new made in the *Viſcera*, and freſhly poured to the blood; the Particles of which, like to unripe Fruit, are crude and undigeſted. Secondly, In the perfect ſtate or maturation, which belongs to the blood being ſufficiently wrought, and made Volatile, according to all its Particles after it is inſpired by Ferments, and its inkindling in the heart exalted. Thirdly, in its defection, which reſpects the blood; after it hath burned forth, and its Spirituous parts are very much flown away, and the reſt growing old and poor, have need to be removed; and ſo they are either the Reliques of Salt, which are with the *Serum* ſtrained forth continually by the Urine; or they are Particles of Salt and Sulphur, boyled and baked together, which are ſtrained forth by the virtue of the Liver into the choleduct Veſſels: or laſtly, they are dregs and earthy recrements of the blood it ſelf, which are carried into the Spleen, and there (as it were a *Caput Mortuum*, exalted by a new digeſtion) go into a Ferment, at length to be tranſmitted to the blood. Whilſt after this manner, the generation of the blood, and its due maturation are truly diſpatched, it is pleaſingly circulated within the Veſſels, neither wanting in motion or heat, nor inordinately troubled with them. But if either the ſupplement of the nouriſhing Juice, be not made agreeable with the reſt of the blood, nor aſſimilated with it, but that either by reaſon of the defect of Concoction, it is waſhed into a very crude humor, or becauſe of its exceſs, it is roſted into a burnt matter; or if the blood growing old, does not lay aſide what it caſts off, and give way to a new Nutritious humor; I ſay, by reaſon of theſe kind of Vices, concerning Sanguification, or the making of blood, the blood is variouſly perverted from its due temper and equal motion, and now becomes Watery and Cold; now Sharp or Salt; now Acid, Auſtere, or by ſome other way degenerate, and ſomtimes obnoxious to ſtagnations, and ſomimes alſo to immoderate heats.

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We may obſerve theſe kind of degrees of crudity, coction, and defection, in the blood, both of the ſound and of the ſick: in healthful perſons after a more plentiful repaſt, Surfeit, or hard drinking, when too much of *Serum* or of Juice, is poured to the blood, its whole maſs being too much diluted with a crude humor, becomes more watery and leſs ſpirituous; wherefore men are rendered ſluggiſh, and unfit for motion or exerciſe. In ſick perſons the Phlegmatic Conſtitution of the Body, induces ſuch a crudity of the bloody maſs, as is diſcerned in the White Dropſie, the Dropſie, *Pica* or longing Diſeaſe, and the *Chloroſis* or Green-ſickneſs. Alſo the ſtate of this kind of crudity, comes in an intermitting Feaver, and in truth is the cauſe of the Feaveriſh acceſſion, *viz.* by reaſon of the dyſcraſie of the blood; the nouriſhing Juice being heaped up, is not aſſimilated to it, but for the moſt part goes into a crude, or otherwiſe degenerate matter; with which, when the maſs of the blood is filled to a plenitude, ſwelling up it brings on the fit.

The ſtate of Maturation, Concoction being finiſhed, happens in healthful perſons, ſome hours after Eating, eſpecially in the morning, to wit, when the ſupplement of the Chyme, is ſpiritualiſed, and as it were enkindled in the whole, by reiterated Circulations: for then men are made more nimble and lively, and more ready for ſtudies, or any buſineſs.

The ſtate of Defection, is in the blood of ſound men after faſting long, hard labor, and want of Food, for then the Vital Spirit being very much evaporated, the maſs of the blood begins to become as it were lifeleſs, wherefore they preſently languiſh, and are made weak. Moreover, the blood by a too long Coction is burned, and grows bilous, from whence thoſe accuſtomed to want Food, or faſting, for the moſt part become ſad and melancholic. Some Diſeaſes habitually induce ſuch a diſpoſition of the blood; ſuch are the Scurvy, the Yellow Jaundies, the Cachexia (or evil ſtate of the Body when the nouriſhing Juice turns to ill humours) long Feavers, and moſt Chronical Diſeaſes, in which, the whole maſs of blood, paſſes from from a Spirituous, into either a ſowr, ſharp, or auſtere Nature.

So much for the comparing of Blood with rich Wine; what follows, being a ſimilitude of it with Milk, conſiſts in the diverſity of the parts, and their ſetling apart, which is chiefly ſeen in its being let forth from the Veins, and grown cold in the diſh. For when the heat and vital Spirit, which conſerve all things in the mixture, are flown away, the remaining parts, depart from one another of themſelves, and a ſeparation of the thin from the thick, and of the *Serum* from the Fibrous blood is made. This ſort of ſeparation of the parts, ſucceeds almoſt after the ſame manner, as in the coagulation of Milk. There are in Milk, Buttery, Cheeſie parts, and Whey. The like is in Blood, ſo long as it doth not much recede from its Natural temper: for it is good, when, being let forth of the Veins, it grows cold in the Porringer, its parts do ſettle after the ſame manner; to wit, the more pure portion, and Sulphureous (like Cream) comes together on the Superficies, which in healthful people, looks brightly red, and this anſwers to the flowring, or head of the Milk: under this lies a Purple thick ſubſtance, which conſiſts of little Thrids and Fibres joined together, and as it were concreted into a clotty ſubſtance or parenchyma, ſuch as the Liver: For the heat being conſumed, and the bond of the mixture loſened, the Fibrous parts lay hold on one another, and by their weight, ſettle into a more thick Coagulum, which anſwers to the Cheeſie part of the Milk: In the mean time, the Serous or Wheyey parts, being thruſt forth from the reſt, get their own Nature, and conſtitute a clear Liquor, like water; which as it is thinner, aſcends to the top, and ſwims upon the reſt. Further, as the Whey of Milk is wont to be further coagulated, and doth yet contain in it ſelf ſome parts both Buttery and Cheeſie, ſo this Liquor ſwiming on the blood, if it be expoſed either to the fire, grows thick, like the White of an Egg a little roſted, or if an Acid Liquor be poured to it, will be precipitated into a white Coagulum. This being ſeen, ſome have thought this watery Latex, to be the nouriſhing juice, which imparts nouriſhment to the whole Body, from the maſs of the blood, in the time of its Circulation, and that the reſt of the blood, is only the Vehicle of Heat and Spirits, and ſerves for no other uſe. But to me it ſeems more likely, that in this watery Liquor is contained the nouriſhing juice, which is imployed on the Nerves, and the commonly termed Spermatic parts, for nouriſhment is ſupplyed to the Muſculous ſtock, from the Fibrous blood of the Parenchyma, or the Liver, Lights, and Milt. After this manner, blood being not much vitiated, goes into parts like Milk; but if it be exceedingly depraved, when it ſettles,

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it ſhews a far different diſpoſition, and as to its ſingle Contents, is allotted into various appearances; for the Cream growing together on the top, is ſeen to be ſomtimes white, ſomtimes green, now yellow, or of livid or lead colour: alſo it becomes not tender, but very viſcous or clammy, that like a Membrane, it can ſcarce be pulled in pieces. When the blood long growing hot with a Feaveriſh diſtemper, is let forth from the cut Vein, in its Superficies, inſtead of a Scarlet Cream, there grows together often a white skin, or of ſome other colour: the reaſon of which is, becauſe the blood is throughly roſted, by too great Ebullition, and its more pure portion, as it were by a certain elixation, is boiled forth from a red and tender ſubſtance, to a white and tough; but if in the mean time the bloody maſs be not ſufficiently purged from the aduſt recrements of Salt and Sulphur, the colour of this little skin becomes yellow or livid, and therefore the water ſwimming over it, is often tinged by the ſame means. Further, the Purple Craſſament or thick ſubſtance, is alſo various: *viz.* ſomtimes it is of a blackiſh colour, when the blood is ſcorched too much, by a long effervеſency. When the Fibres are vitiated, as in the Liver, they grow not together, but the Liquor like Beaſting Milk, remains ſomwhat thick, and yet fluid; which indeed argues a great corruption of the blood; as uſes to happen, in a putrid Feaver, a very great Cachexy, ſomtimes the watery Latex is wanting, as in Hectical people, and in too great a Diaphoreſis. Somtimes it ſuperabounds, as in Dropical people, neither will the whole go into a white Coagulum, by heat: In ſome Cachectical people, the blood being made more watery, appears like watered fleſh. I knew one, indued with a vicious habit of body, that was wont to have blood of a whitiſh colour, and like to Milk when it was let forth, and afterwards, when he grew better by Chalybiat Medicines, his blood was moderately red: but concerning the ſetling of the blood and its appearances, there is enough. But as blood being emitted from the Veſſels by its coagulation and departure of the parts one from another, imitates the various ſubſtances of congealed Milk, ſo ſomtimes being ſhut within the Veins and Arteries, like ſame fuſed by a Coagulum, enters altogether into the like mutation from Morbific cauſes; by reaſon of which change, being hindred in its Circulation, or ſomwhere congealed and fixed according to its portions, it produces many diſtempers: for it ſeems, that from hence the Pleuriſie, the Squinancy, the Inflammation of the Lungs, the Dyſentery, take their Original, and to this Cauſe the Peſtilent diſeaſes, ow chiefly their deadlineſs, as ſhall be ſaid hereafter in its place.

It is ſufficient that we have hitherto drawn a parallel of the blood, from which compariſon with Wine and Milk, may be gathered what ſort of Particles and Subſtances, it comprehends in it ſelf, *viz.* Spirituous, and very agil or nimble, (ſuch as generous or rich Wine has) for the heat and motion; and beſides ſoft and tender (ſuch as are in Milk) for the nouriſhment of the Body. Yea alſo, this Analogy of it with Wine and Milk, is yet further confirmed by the uſe of them in our diet, out of which the blood is generated; foraſmuch as Milk is the beſt and moſt ſimple Aliment, and with it Infants, and Children, who have need of a plentiful proviſion of blood are nouriſhed chiefly: But Wine copiouſly begets vital Spirits before all other things, and being weak and fallen, excellently reſtores them, wherefore it is wont to be eſteemed inſtead of Nectar for old men, or thoſe of ripe years.

The Nature and Analyſis of the blood flowing within the Veſſels, being opened after this manner, the Nutritious Juice deſerves yet our conſideration, being ſupplyed from the blood, and ſeparated out of the maſs of blood, for the nouriſhment of the ſolid parts, and cleaving to them (whereby it may be the better aſſimilated) like Dew. For the Nerves, Tendons, and the reſt of the ſolid parts of the whole Body, are waſhed with a certain alible juice. The Vital Spirits, having obtained the Nervous Bodies for a Vehicle of this, blow them forth at length, and expeditiouſly execute the actions of Senſe: alſo that humor coming upon the ſolid parts, and aſſimulated with them, inlarges their bulk, and growth. This is not a place to inquire after the Origine, Birth, and manner of the diſpenſation of this: It ſhall ſuffice only, that we have noted, that it is ſupplyed from the maſs of blood, and (as it is rendered highly probable by the moſt Learned Doctor *Gliſſon*, and Doctor *Wharton*) after it hath paſt through the Nervous part by a certain Circulation, what remains, being now made as it were poor, and lifeleſs, is ſent back by the Lymphatic Veſſels, to the blood. Whilſt this Juice, being little cocted, or purged from dregs, is ſent from the depraved blood, to the Nervous parts, tis wont variouſly to irri-

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tate them into Cramps and Convulsive Motions; also, no few Symptoms in Feavers, arise by reason of the depravation, and irregular Motion of this Juice, as shall be more largely laid open in another place.

Chap. II.

Of the Motion and Heats of the Blood.

So much for the Anatomy of the Blood, as to its primary Elements and Constitutive parts, into which it is sensibly wont to be resolved; also as to its Affections, which appear clearly, by the comparing it with Wine and Milk: it remains for us next to enquire concerning the motion of the Blood, both Natural, (*viz.* by the help of what Ferment, and by what swelling up of parts, it is Circulated in a perpetual motion through the Vessels) and preternatural, *viz.* for what Causes, and what fury of parts, when it boils up above measure in the Vessels, and conceives Feaverish Effervescences. These being rightly unfolded and premised, we will enter upon the Doctrine of Feavers.

Concerning the Natural Motion of the Blood, we shall not here enquire of its Circulation, *viz.* by what Structure of the Heart and Vessels, it is wheeled about after a constant manner, as it were in a water Engine; but of its Fermentation, *viz.* by what mixtion of parts, and mutual action of them together among themselves (like Wine fermenting in the Ton) it continually boils up. And this kind of motion, (as it were truly an intestine war of the blood) depends both on the Heterogeneity of the parts of the blood it self, and on the various Ferments, which are breathed into the mass of the blood from the Bowels.

As to the first: those things which have altogether like Particles do not ferment, wherefore, neither distilled waters, Chymical Oils, Spirits of Wine, or other simple Liquors are moved, as hath been already observed: but I have said, that Blood, according to the Nature things quickly irritable, doth consist of a proportionate mixture of the Elements; in which Spirits, for that they are very nimble, continually strive to expand themselves and to fly away: but being intangled by the more thick Particles of the rest, they are detained in their flight. And being detained after this manner, they toss about, break to pieces, and very much subtilise the more thick little Bodies, by which they are hindered; they volatilise the Salt, otherwise fixed; by a most minute kneading, and by the adhesion of it, they perfectly dissolve the Sulphur, compacted in it self, and not miscible with the rest, and boil it in the *Serum*. They break the Earth, even to its smallest parts, and mingle it with the rest. But in the mean time, by the striking and molding the Salt and the Sulphur, *Effluvia's* of heat plentifully proceed, which being mixed with the rest, and on every side diffused, increase the motion of the Fermentation. And after this manner all being most minutely broken and diluted with watery Particles, they constitute the Liquor of the Blood: which, whilst in the Vessels, as Wine shut up in a Pipe, continually ferments, and, according to all its Particles is in perpetual motion.

But the Fermentation of Wine, and of Blood, differs in this: that in Wine there is no wasting of the old parts, and a coming again of new; but the Liquor being shut up in the Vessel, remains still the same: but 'tis otherwise in Blood, in which some parts are continually destroyed, and in their place others are always generated anew. In Wine, the times of crudity, maturation, and defection, are distinct, and are successively performed in the whole; In Blood, that threefold state is celebrated at the same time and by parts: Fermentation being once begun in Wine, is continued even to the end; but in Blood, because it is washed still with crude Juices, it ought still to be renewed; by which means, the Nutritious Particles, not of kin, are assimilated to the rest of the Latex; wherefore, for this work, besides the Fermentation once begun in the blood, there is need of some Ferments, which may continue the same, otherwise about to leave off.

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That Ferments are required for the making of Blood, this is an Argument; that when they are wanting by Nature, they are with good ſucceſs ſupplyed by the work of Art: for fixed Salts, *Alcaly* Salt, Extracts, Digeſtives, Openers, and eſpecially Chalybeate Remedies, help for this reaſon, that, as it were by a certain Ferment, they reſtore anew, the weak, or almoſt extinct Ebullition or Boiling of the Blood.

As to what reſpects the Natural Ferments, very many may certainly be formed, and in divers parts, or hid in the Bowels: for any humor, in which the Particles of Salt, Sulphur or Spirit, being much exalted, are contained, puts on the Nature of a Ferment: after this manner, the flowring or dregs of Beer or new Wine, being kneaded with Meal, and the maſs kept to a ſowrneſs, come under this rank, by which new Beer, and the like Liquors, as alſo the maſs of Bread, are moſt excellently Fermented. In like manner in the Ventricle, a ſowriſh humour participating of exalted Salt, there helps concoction: and in the Spleen, the feculencies of the Blood from Salt and Earth being exalted, go into a Ferment.

How much vigor comes to the Blood from the Womb and Genital parts appears from hence, becauſe by the privation, or evil diſpoſition of them, follow, in Maids the Green ſickneſs, in men, barrenneſs or loſs of virility, want of Beard, and a ſhrill voice. But the chief Ferment, that ſerves for ſanguification, is eſtabliſhed in the Heart; for this is the chief fire-place, in which the cruder Particles of the Chyme, are as it were inkindled, and acquire a volatileneſs: which thing may be confirmed by many reaſons, but eſpecially by its effects, which we ſuffer in the precordia, as often as the Blood ferments more or leſs than it ought to do: for when it is too much inkindled in the Heart, it is agitated impetuouſly, as it were by fires put under it; the ſigns of whoſe immoderate Ebullition are, a deep pulſe and vehement, then almoſt an intolerable heat in the Precordia, with a vehement thirſt; on the other ſide, when the Fermentation of the blood is leſſened in the Heart, we are affected with an anhelous, and difficult reſpiration upon any motion; as may be perceived in the Dropſie, Cachexia, and Yellow Jaundice: the reaſon of which is, not becauſe the Lungs are ſtuffed, or filled full of a tough or clammy matter; but becauſe the blood doth not rightly ferment, in that Repoſitory of Fermentation; wherefore, being fallen into its Boſom, it is not preſently Rarified; nor doth it ſoon leap forth into the Lungs, but being apt to ſtagnate, and remain there, cauſes an oppreſſion of the Heart it ſelf; for the helping of which, frequent breathing is made, that the blood being let forth into the Lungs, ſuccour might be brought to it: but if by motion or exerciſe, the blood be more provoked into its Ventricle, than can be derived by reſpiration, or the pulſe, into the Pneumonic Veſſels, there is danger of choaking. The like happens in thoſe that are dying: when the pulſe is very ſmall, and the blood being heaped up in the Heart for want of Fermentation, begins to ſtagnate and to clodder, we then breath deeply, with a noiſe and elevation of the breaſt; to wit, the blood with the ultimate endeavour of Nature, and the whole force of the Lungs, as long as it is able to be done, is emptied forth into the Lungs, leſt reſiding in the Heart, it ſhould wholly choak it.

Therefore, Motion and Heat, in the Blood, depend chiefly on two things, *viz.* partly on its own proper diſpoſition and conſtitution, by which, it being forged very greatly with active Principles of Spirits, Salt, and Sulphur, of its own accord ſwells up, or grows turgid in the Veſſels, even as Wine in the Ton: and partly on the Ferment implanted in the Heart, which very much rarifies the Liquor paſſing through its Boſom, and makes it to leap forth with a frothy heat: that the blood, which is quietly inſtilled to the Heart through the Veins, running gently like a River, from thence leaping forth through the Arteries, (like a Torrent) with noiſe and rage, might be carried forward, to all the parts of the whole Body. By what means this is done, though it is not eaſie to explicate Mechanically, yet the manner, and ſome not improbable reaſons of this thing, are delivered by moſt Learned men, *Ent*, *Cartes*, and others. They ſuppoſe indeed, as it were a fire to be ſet in the Chimny of the Heart, which preſently inkindles the blood infuſed through the Veins, (even as a flame put to Wine burns it) which being ſo inkindled, by its deflagration (like lightning) paſſes moſt ſwiftly through the Arteries: ſo that heat, a moſt rapid motion, and *Effluvia* ſent by Perſpiration, are wont to proceed from the accenſion of the blood in the Heart only. *Hogelandus* affirms, that there is a Ferment hid in the Boſom of the Heart, that compels the Liquor of the blood to boil up, and to grow hot, with heat, and a plentiful emiſſion of Soot, juſt like Spirit of Nitre, when it is poured on the Butter of Antimony: ſo that the

blood flowing in gently through the Veins, being forthwith Rarified into ſpume and vapour by the ferment of the Heart, runs very impetuouſly through the paſſages of the Arteries. Tis almoſt the ſame thing, whether it be ſaid to be done, either by this, or by that way: for the alteration which the blood receives in the Heart, may be equally deduced from a flame, or a Nitrous Sulphureous ferment, there ſuppoſed to be placed. Becauſe, whilſt the blood ſlides into the Ventricles of the Heart, preſently the frame of the Liquor is looſned, and the active Particles, eſpecially the Spirituous and Sulphureous, the bond of the mixture being broke, do leap forth from the reſt, and ſtrive to expand themſelves on every ſide; but being kept in by the Veſſels, and being forced together with the remaining Liquor, through the open paſſages of the Arteries, they ruſh with violence, and ſwelling up by the way they can find, and by that means, diffuſe *Effluvia* of heat, through the whole body: there is little difference, whether this expanſion of the Particles of the blood, and exertion into the liberty of motion, be ſaid to be done by Accenſion, or by Fermentation, foraſmuch as by either way, the frame of the blood may be ſo unlocked, that from thence the Particles of Spirit, Salt, and eſpecially of Sulphur, being incited into motion, (as it were by an inkindled fire) may impart heat to the whole Body.

But this Rarefaction, or Accenſion of the blood in the Heart, very much depends upon the diſpoſition and conſtitution of the blood it ſelf: for if its Liquor be rightly cocted, being made volatile, and (like rich Wine) brought to maturity, it then Ferments there after its due manner, whereby the ſoluted Particles of the Spirits and Sulphur, diffuſe an equal, and moderate heat to all parts. But if the blood, by reaſon of an ill manner of feeding, and want of Concoction, be crude and watry, then it is leſs inkindled in the Heart; and from thence follow a frigid intemperance of the whole, difficult breathing and wheeſing, with a weak pulſe, and languiſhing; as in Cachectical people, thoſe diſtempered with the Green Sickneſs, and ſuch as are about to die, may be perceived: but if the blood becomes too luxuriant, and apt to grow turgid, by reaſon of plenty of Sulphur being carried forth, or of its *Effluvia* being reſtrained, or of eating hot things; either its Accenſion or Fermentation in the Heart, is very much increaſed, ſo that from thence a Feaveriſh heat, and greater effervеſcencies than uſual, are ſtirred up in the whole. This various Fermentation of the blood in the Heart, according to the various temper of the ſame, may be illuſtrated by the example of Wine: freſh Muſt, that is yet crude, though it be boiled, or put on the fire, will not burn; but this being purified and brought to maturity, is eaſily inkindled, but ſends forth a ſmall flame, and quickly out. The ſame at firſt growing hot, or otherwiſe warmed, if inkindled, is greatly inflamed, and for the moſt part is conſumed by its burning.

Whilſt the Blood, after this manner being rarified, or inkindled in the Heart, and from thence growing hot, through the paſſages of the Veſſels, is reſolved into minute parts, ſome little bodies depart from its looſned frame, which refuſe at laſt to be united, and fitted with the reſt of the Liquor: but theſe are of a twofold Nature; either thin, which like ſmoke from the burning fire, or *Effluvia* from a Fermenting Liquor, do evaporate from the Liquor of the Blood, by a conſtant Diaphoreſis, through the breathing holes of the Body; or more thick, which like aſhes left after burning or the ſettling dregs after Fermentation, ought to be ſoon ſtrained from the maſs of Blood, and to be carried forth of doors: for otherwiſe, by their confuſion, they produce notable perturbations in the Blood. Whereby the Blood growing more hot, is diſſolved in the Heart, therefore theſe recrements, both Fuliginous and Earthy, are more plentifully heaped together; and when by reaſon of too great congeſtion, they cannot be preſently ſubdued and ſecluded from the maſs of Blood, they bring forth a ſwelling up of the Blood and Feaveriſh Heats.

Concerning the Motion, Heat, and Natural Fermentation of the Blood, in the equal tenor of which, the means of our Health conſiſts, what hath hitherto been ſpoken, ſhall ſuffice. We will treat a little more largely of the preternatural, or too great effervеſcency, on which the types, and Paroxyſms of Feavers depend: I call that too much, or Preternatural Fermentation, when the Blood, (like a Pot boiling over the fire) grows hot above meaſure, and being rarified with a ſwelling ſpume, diſtends the Veſſels, excites a more quick pulſe, and like a Sulphureous Liquor having taken fire, diffuſes a burning heat on every ſide.

This kind of motion or Fermentation of the Blood, will be beſt of all illuſtrated by an example of Wines growing hot. For Wines, beſides the gentle and equal Fermentation,

mentation, by which they are at first purified, at some times do so remarkably grow hot, and boil up, that they fly out of the mouth of the Vessel, and if they are closely stopped up, cause it to burst in pieces. After this manner, as if struck with fury, unless they are immediately drawn away from the Tartar; or their Lees into another Vessel, they will not cease from growing hot, until the Spirit being very much loosned, and the Sulphur or Salt too much exalted, they are either made unsavory, or degenerate into a sowrness.

Such an Effervescency in wont to be stirred up for two causes chiefly: First, When any extraneous thing, and not miscible, is poured into the Ton, (so some drops of Tallow, or Fat, being dropped into the Cask, will produce this motion) or secondly, when Wines being enriched with too rich a Lee or Tartar (by reason of the Sulphureous parts being above measure exalted) conceive heats of their own accord, and exceedingly boil up. For in whatsoever substance Sulphur abounds, and its Particles being loosned from the mixture, consociate together, and are bound close in one, there such immoderate heats are procured.

After a like (tho not wholly the same) manner, whereby Wines grow hot, the boiling up of the Blood is induced, to wit, either what is forein, and not akin to the Blood, is mixed with it, that when it is not assimilated, is wont to cause a Perturbation, and growing hot, until that Heterogeneous thing, is either subdued or cast forth of doors; and the Particles of the Blood being confused and troubled, are at last shaken forth, and that they get again their former place and position in the mixture. Or, Secondly, the Blood grows hot above measure, because some Principle, or its constitutive Element, (*viz.* Spirit or Sulphur) is carried forth beyond its Natural temper, and becomes enraged; whereby indeed the Particles of this or that, being not agreeable to the rest, are loosned from the mixture; being loosned, they become more violent than they ought, shake much the Liquor of the Blood, and bring forth a heat, which is not allayed, till the Blood being as it were inflamed, burns forth with the long fire of a Feaver. By either way, whether the Blood grows hot in the Vessels, by reason of the pouring in of a thing not miscible, or by reason of the rage of the Spirit, or Sulphur being carried forth, because from thence its frame is more loosned, therefore it is more inkindled in the Heart; and the active Particles first loosned from the Ferment there implanted, do grow exceeding hot, leap forth from the mixture, and disperse on every side by their motion, a strong heat, and as it were fiery: but yet with this difference, that the Effervency, which depends upon the mingling of some extraneous thing with the Blood, is for the most part short, or renewed, which, when what was Heterogeneous is separated or subdued, is quieted of its own accord, and the shaken parts of the Blood, and put out of order, easily return to their Natural site and disposition. But the Ebullition which arises from the inordination of the Spirit or Sulphur being enraged, is continual; to wit, here the whole mass of the Blood is so loosned, and dissolved from the strict bond of the mixture, that as an Oily Liquor having taken fire, it ceases not to grow hot, or to be inflamed, till the Particles of Spirit, or Sulphur, or the Combustible matter, be for the most part burnt out.

There remains yet a third manner of Preternatural Fervency, whereby the Blood is subject to alteration, which happens not to Wine, but most often to Milk; *viz.* when at any time, from a Morbific cause, a coagulation of its Liquor is induced, so that its substance is poured forth, and goes into parts, and there is a separation made of the thick and earthy from the thin; by which means the Blood is not fitly circulated in the Vessels, but that its congealed portions, being apt to be fixed in the extream parts, or to stand still in the Heart, do interrupt the equal motion, or grievously hinder it: For the sake of the restoring of which Effervency, greater are wont to be stirred up in the Blood, to wit, such as happen ordinarily in a Plurisie, the Plague, Small-pox, or the Venereal Disease.

Chap. III.

Of Intermitting Feavers or Agues.

BY the Premiſes which we have ſpoken of already, concerning the Anatomy, Motion, and Heats of the Blood, there now lies open an eaſie paſſage to the handling of Feavers. The Notions which are commonly ſet forth, concerning a Feaver, out of the force and Etymology of the word, I here purpoſely omit: It may be deſcribed after this manner, that it is, An inordinate motion of the Blood, and a too great Heat of it, with burning and thirſt, and other Symptoms beſides, whereby the Natural œconomy or Government, is variouſly diſturbed. As we have remarked already, concerning the growing hot of the Blood, ſo now we do of a Feaver, that indeed, its acceſſion is either ſhort, and by fits, which is therefore termed Intermitting; or elſe great, and long protracted, which is called a continual Feaver. We will firſt ſpeak of the Intermitting Feaver.

Tho an Intermitting Feaver, in our Popular Idiom, is known by a proper Name, and is diſtinguiſhed contrary to a Feaver commonly taken, yet becauſe it hath too great Effervency of the Blood joyned to it, it is to be called a Feaver. It is peculiar to this, from a continual Feaver, that it hath certain remiſſions, or times of intermiſſion; that every fit begins with cold or ſhaking, for the moſt part, and ends in Sweat; that the acceſſions or coming of the fits, return at ſet Periods, and certain intervals of times, that a Clock is not more exact. Wherefore, we will firſt diſcourſe concerning this Feaver in general, what ſort of heat of the Blood it is which continues its fit, and from whence it is raiſed up. Secondly, Wherefore the fit appears equally with cold and ſhaking, as with ſweat following. Thirdly, What may be the cauſe of the Inmiſſion, as alſo of its certain ſet Periods. Fourthly and Laſtly, Are added ſome irregularities of Intermitting Feavers, as when now cold, now heat or ſweat is wanting; or when the Periods are wandring and uncertain, when the Remiſſion or ſpace of Intermiſſion, is not equal, but now comes ſooner, now later, and ſomtimes redoubled: and I will endeavor to ſhew the reaſons of theſe: and of other Phenomena or appearances, which variouſly happen in this Diſtemper. Theſe being laid open, we will go on to unfold in the next Chapter, the diviſion of an Intermitting Feaver, and the kinds of it.

As to the firſt: The Effervency of the Blood in an Intermitting Feaver, (or Ague) for the time of the fit, is as violent and ſtrong as in a continual Feaver: wherefore, it is concluded, that the parts of the Blood, among themſelves, or ſome Heterogeneous thing being mixed with it, do ſtrive together, and Ferment above meaſure. But there is required, that they may Ferment, or too greatly boil up among themſelves, that ſome Principle, as chiefly Spirit or Sulphur, being too much exalted and enraged, do appear above the reſt; which, when it cannot be yoaked with them, brings in a continual ſtrife and heat: but from this cauſe, a continual Feaver draws its riſe, becauſe ſuch an Ebullition of the Blood, being once begun, is not ſuddenly allayed, and when it is appeaſed, it does not afterwards preſently return. Wherefore for an Intermitting Feaver, 'tis to be ſuppoſed, that ſome Heterogeneous thing is mingled with the Blood, whoſe Particles, when they are not aſſimilated, make ſo long an Ebullition of the ſame, till either being kneaded, they are rendered miſcible, or being ſubtiliſed, are ſhut forth of doors. Wherefore, ſuch a matter being brought under, or ſhut forth of doors, the fit ceaſes, and when this matter ſprings again, it ſtirs up a new Ebullition, and ſo a new fit is brought on.

Concerning this Matter, which being mixed with the Blood, induces the periodical Heats, and the other Symptoms of an Intermitting Feaver, 'tis very ambiguouſly, and diverſly diſputed among Phyſicians, where it is generated, in what ſeat or place it lodges, and by what means it ſo exactly obſerves, the times of its Motion, and Ebullition. But it would be a work of too much labour and tedioufneſs, to recount here all the Arguments, of the Ancients, and Moderns, to reduce them into order and to weigh their reaſons; Wherefore, doubting, I propoſe what has come into my

my mind, when I thought deeply of the matter, and ſubmit to the judgment of others.

Of neceſſity there is ſomthing, which brings in the Heat of the Blood exactly periodical, that is generated in our Body at the ſeveral periods, or acceſſions of the Feaver, always in a ſet meaſure, and equal proportion, and is communicated to the maſs of Blood; with which when the Blood is filled to a plenitude, it forthwith grows turgid, and conceives an heat: But this is ſuppoſed to be either an Excrementitious humor, ſliding down into ſome Mines, which by degrees, and at a ſet time, being brought to an increaſe, and moved, Ferments with the Blood: or it is the nutritious Juice, ſupplyed from the matter of Food, and delated in weight and meaſure, which, when it is not aſſimilated, by reaſon of a defect in ſanguification, being heaped up to a fulneſs, for its own expulſion, induces a turgency in the Blood. The reaſon of Intermitting Feavers, is commonly explicated by the former way, and the cauſes of the Intermiſſion, and ſet times of approach, are fetcht from the nature of the Humor, and the ſeat, or place where it is cheriſhed. The Neſt, or Mine of this Diſeaſe, almoſt by an unanimous conſent, is fixed on the firſt ſhop of the Body, and from hence the reaſon of the Intermiſſion is fetched, and the continual difference of an Intermitting Feaver: but they affirm the matter to be Choler, Phlegm, and Melancholy; and as theſe humors are ſaid to putrifie ſlower, or ſooner, ſo the Feaveriſh courſes, are ſaid to be abſolved, in the ſpace of one or more days. But this Opinion, after the Circulation of the Blood hath been made plainly known to all, is deſervedly rejected. For when the Blood never ſtagnates in the Veſſels, but waſhes every place with a perpetual motion, and continually carries away their filth, it is impoſſible that the Mine of this Diſeaſe ſhould ſubſiſt in the Meſaraick Veins, where it is commonly aſſerted to be: as to what belongs to the cavities or dens, for the heaping up of the humors in the Viſcera, it neither appears, by what means ſuch ſhould be formed without a Tumor or Impoſthume; nor by what inſtinct, ſuch humors, ſhut up in their Neſt, do increaſe, are conſumed, and laſtly ſpring forth again, at ſo exact intervals of times. Beſides, what is affirmed concerning Bile, Phlegm, and Melancholy, and of their periodical motions, we hold wholly ſuſpected; becauſe theſe ſort of humors, are not afforded ſincere, ſuch as are deſcribed in the Schools: but the Blood, having gotten a various diſpoſition, now being hotter, now colder, its nature imitates the qualities of ſuch humors; or in its Circulating, it lays aſide its Recrements, which being depoſited in little Cheſts or Veſſels, are falſely believed to be Morbific, and Preternatural humors. Wherefore, as the nutritious Juice, is the only humor wherewith the maſs of Blood is dayly refreſhed, and its ſupplements are made ſtill in meaſure, and proportion, without doubt, the periodical heats of the Blood, are to be drawn from the acceſſion and commixtion of this.

I have already remarked concerning the Particles of the Blood, a triple ſtate of crudity, maturation, and defection: to wit, the nouriſhing Juice, ſupplyed from the dayly Food, comes crude, is mixed with the Blood, and being for ſome time Circulated, is aſſimilated to it, and is ripened into a perfect humor: afterwards growing ſtale, it goes into parts and is laid aſide. Whilſt after this equal manner, the Blood is continually reſtored, and its loſſes repaired, it very quietly Ferments, without any trouble, or immoderate heat, and is Circulated within the Veſſels; but if the ſupplement of the nouriſhing Juice, is not (as before) ripened, nor goes into Blood, by a perfect digeſtion, its Particles being confuſed with the Blood, remain as it were ſome Heterogeneous thing, and not exactly akin, in the maſs of Blood; with which, when it is filled to a plenitude, the Blood forthwith grows troubled, and conceives a Feaveriſh heat, whereby the freſh ſupply of this depraved Juice, is either overcome or caſt forth of doors. I ſay therefore, from the firſt inſtant, in which the nouriſhing Juice is not aſſimilated with the Blood, its Particles, tho mixed with it, are as yet Circulated with it, without any great tumult or perturbation, and ſo afterwards till the maſs of the Blood is filled with them to a turgency: but then it quickly boils up, and conceives a heat: almoſt after the ſame manner, as new Beer put into Bottles, which, if they are cloſely ſtopped, that nothing may evaporate, is at firſt contained in thoſe Veſſels, without heat or force; afterwards when the *Effluvia* being ſtill reſtrained, the maſs of the Liquor ſwells up, notably Ferments, and by reaſon of the force of Fermentation, oftentimes makes the Bottles fly in pieces: alſo this happens at a ſet time, and in the ſpace of ſo many hours, as in an Intermitting Feaver, the Liquor ariſes to its height of turgeſcency.

There

There yet remains a difficulty, for what cauſe the nutritious Juice, being confuſed with the Blood, is not aſſimilated, but degenerates into an Heterogeneous, and Fermentative matter: I ſuppoſe this to be done, for the moſt part, not by the default of the Aliments, nor yet of the Bowels, but by the vice of the Blood it ſelf. For the Blood, even as Wine, ſomtimes paſſes from its native and genuine diſpoſition, into an acid, ſowr, or auſtere diſpoſition; and becauſe the Blood makes Blood, it comes to paſs, that when it is departed from its due temper, it eaſily perverts the proviſion of the nutritious Juice, by which it ſhould be repaired. What that diſpoſition of the Blood is, and by what means contracted, ſhall be told hereafter, when we ſpeak of the kinds of Intermitting Feavers, and of their evident, and Procatarctick cauſes. The Heat, or Effervescency therefore of the Blood, which conſtitutes the fit of an Intermitting Feaver, depends only upon the aſſimilation of the nouriſhing Juice being hindered; the Particles of this being commixed with the Blood, are not (as before) ripened, nor are made into perfect Blood; but by the mixture of theſe, the maſs of Blood (as it were new drink) is imbued with little Bodies greatly Fermentative; when the which are more thickly heaped together, and the Blood is filled with them to a ſwelling up, it preſently grows hot, and a mighty agitation, and ſtriſe of the Particles is made, by which, they break, and ſubtiliſe one another, till at length the vital Spirit getting the dominion, and the reſt being brought under, what is extraneous is thruſt forth of doors, from the company of which, the Blood being freed, the remiſſion, and intermiſſion of the aguiſh fit follows; but afterwards from a new ſupply of this Juice, a new fit is brought on.

Secondly, As to the ſhaking, or cold preceding the heat, in this Diſtemper, I ſay, when the Particles of the nouriſhing Juice, do proceed from a ſtate of crudity, towards maturity, but do not attain it, they contract a notable ſowriſhneſs, with which they greatly prick, and haule the nervous parts, and cauſe the ſenſe of cold: even as new Beer, which being ſtopped cloſe in Bottles, paſſes from a ſweet into an acid and nitrous taſt, that for the cuttingneſs and cold, can ſcarce be ſwallowed. When therefore, the Particles of this ſort of crude Juice, being indued with a Nitrous ſowrneſs, do fill the maſs of the Blood to a fulneſs, or to a ſwelling up, and when they being more thickly heaped together, begin to enter into a Flux, they firſt of all ſtrike down the Vital Spirits, with their ſharpneſs, and ſomwhat overthrow their heat; wherefore the Blood becomes colder, and is more ſlowly circulated: yea, and by reaſon of the defect of heat, the ſenſe of cold is perceived in the whole Body, and a pulſe very rare exiſts. Moreover, when the nervous and ſolid parts, are watered with this ſort of acetous Juice, for their laſt nouriſhment, by the Flux of this, which happens together with the turgeſcency of the Blood, theſe ſenſible parts are pulled, and irritated into Tremblings and Convulſions. And this without doubt is the true and genuine cauſe of the cold and ſhaking, which are excited in a fit of the intermitting Feaver; to wit, the Flux, and ſwelling up of the nouriſhing Juice, degenerated into a Nitrous matter, with which the Spirits and Heat being ſuffuſed, are blunted, and the Nervous Bodies being provoked, are moved into tremblings. But afterwards, when theſe Nitrous Particles being thruſt forth, from ſome part, into the Superficies of the Body, the Blood is ſomwhat freed from their weight and oppreſſion, the Vital Spirits recollect themſelves, and begin to ſhine forth; but from thence a moſt intenſe heat ſucceeds, becauſe, both the maſs of Blood, by reaſon of the growing hot with the Feaveriſh matter, being looſened, and alſo its mixture being laxed, the Sulphureour Particles are more plentifully inkindled in the Heart; and becauſe (the pores of the skin, being poſſeſſed by the ſame matter, thruſt forth towards the circumference of the Body) the vaporous *Effluvia* are reſtrained within, which do more ſhake, and make hot the Blood; that heat perſiſts ſtill in the Blood, until that Fermentative matter being wholly burnt out, and together with the aduſt recrements, remaining after the burning, being fully brought under, and ſubtiliſed, and involved with the *Serum*, inſenſibly evaporates by ſweat, or tranſpiration.

Thirdly, Theſe things being premiſed, it will not be hard to ſhew the reaſons and cauſes of the intermiſſion, as alſo of the ſet periods, *viz.* the intermiſſion follows, becauſe all the Morbific matter is diſperſed in one fit, and ſo till new be ſubſtituted, there is a neceſſity that a remiſſion follow. But new matter begins to be begot, of which the laſt fit failed, to wit, the maſs of Blood being but now emptied, receives the nouriſhing Juice, and perverts it (as before) by reaſon of its defect of due making of Blood, and of Concoction, into a Fermentative matter; but its little plenty, ſtirs up little or no trouble,

trouble, or Fermentation; but when the Blood is filled to a ſwelling up, it preſently ferments, and is in Flux, even as when new Beer, or new Wine, ſhut up a long while in a Veſſel, at length, at a certain time, boils up, and leapes forth at the mouth of the Veſſel.

But that the Fits, or Acceſſions, do for the moſt part come again, at ſet intervals of times, and that ſo certainly, that a Clock is not more exact; the reaſon is, becauſe the nouriſhable Juice, is for the moſt part ſupplyed from the Viſcera, to the Blood flowing in the Veſſels, in an equal meaſure and manner; for tho we do not dayly take exactly, ſo much meat and drink in weight and dimenſion, yet, becauſe we for the moſt part eat at ſet hours, for the ſatisfying the Appetite, from the things eaten, and the maſs of the Chyme heaped up in the Bowels, an equal portion of the nutritious Juice is conveyed to the Blood through the Milky Veſſels: wherefore, if at ſuch hours, ſo much of the nutritious humor is poured into the Blood, which increaſing to a fulneſs, and ſwelling up, it brings on the fit that day: certainly, this being finiſhed; in the ſpace of the ſame time, ſufficient matter is laid up, for the following fit: But if errors in feeding be committed, and that the ſick indulging their Appetite, eat more plentifully or inordinately, the approach of the fit anticipates the wonted hour, by reaſon of the Bloods being filled ſooner with the Feaveriſh matter; if that the ſick are abſtemious, and more ſparingly take their Food, the intermiſſion is drawn out longer.

If it be yet asked, wherefore the periods of intermitting Feavers, be not of one kind, and of the ſame diſtance, but that ſome repeat or come again dayly, others on the third or fourth day? The cauſe is the diverſe conſtitution of the Blood, to wit, whereby it is perverted from its due temper, now into a ſouriſh, now into an acid or ſharp, or into an auſtere or harſh diſpoſition. By reaſon of the diverſe evil conſtitution of this, the alible Juice, being freſh carried, departs more or leſs from maturation, and is perverted into matter, apt ſooner or later to ferment. When the Blood has acquired a ſour, hot, and bilous diſpoſition, I ſuppoſe that ſome part of the nouriſhing Juice is ripened into perfect humor, and is aſſimilated with the Blood, and ſo goes into Food, to be carried to the ſolid parts, and is affixed to them; but the other part of it, from the Blood being too much cocted, and depraved, is changed into a Feaveriſh matter, and ſuppoſing, that half of the nutritious Juice is after this manner perverted; in double the time, in which it is ſaid to have a full Concoction in our Body, (that is, after eight and forty hours) this kind of Fermentative matter, riſes to a plenitude, and turgeſcency, and then induces the fit of a Tertian Feaver. If that, by reaſon of the auſtere, and pontic nature of the degenerated Blood, (in which a fixed Salt, with an Earthy *Fæces* is exalted too much) and therefore apt to ferment more ſlowly, only a third part of the nutritious Juice is corrupted, then in three times the ſpace of the aforeſaid time, the fit is induced; that is, after ſeventy two hours, in which, the period of a Quartan, is wont to be concluded. But, if by reaſon of a greater infection of the Blood, almoſt the whole ſupplement of the nutritious Juice is perverted into a Feaveriſh matter; then in the ſpace of that time, in which the plenary coction ought to be abſolved in the Veſſels and habit of the Body, (that is after twenty four hours) this matter ariſes up to the motion of turgeſcency, and brings on the Quotidian fit. And hence it comes to paſs, that in a Quartan Feaver, ſtrength and courage do not preſently fail, whilſt in a Tertian, the ſick are wont to become more weak; but in a Quotidian Feaver, they are ſooner brought into languiſhing, and greateſt weakneſs: to wit, in each, as more or leſs of the nutritious Juice goes into the Food of the Diſeaſe, ſo much alſo is drawn away, from the ſtrength and firmneſs of the Body. But more fully of theſe, when we treat of the ſeveral kinds of Intermitting Feavers, and the Cauſes of them.

Againſt the equal Circuits of theſe Feavers, it is argued: that for the moſt part, the fits do anticipate the ſet time of the day, by the ſpace of ſome hours, and ſometimes alſo come after it. But in truth, this objection is taken away, if the times of intermiſſion be computed, not by days, but by hours; for ſo the intervals which but now ſeemed to be now ſooner, now longer protracted, will appear for the moſt part equal, by this Rule; foraſmuch as in reſpect of the day, it is ſaid a Tertian Feaver, ſomtimes prevents the wonted time of its acceſſion, two, three, or more hours, or comes after it; in the mean time, every circuit exactly repeats or comes again, every time, after ſo many hours. Wherefore the chief differences of Intermitting Feavers, conſiſt in this only, that the time of the acceſſion in one Feaver, comes more ſwiftly,

ſwiftly, and in another more ſlowly, *viz.* now at twenty four hours diſtance, now at thirty four, now at ſeventy or the like.

From what hath been ſaid, (unleſs I am deceived) it clearly appears, what the Efferveſcency of the Blood is, which conſtitutes the fit of an Intermitting Feaver, from whence the fore-runners of cold and ſhaking, and laſtly, what may be the reaſon of the intermiſſion, and of the ſet periods. But that theſe, and many other appearances of this diſtemper, depend upon the evil diſpoſition of the Blood, and becauſe of the depravation of the nutritious Juice, and not from humor, lurking in ſome mine, will yet more manifeſtly appear, from the collation of the ſigns and ſymptoms, which are to be met with, worthy of note, in this diſtemper: then ſecondly, from the Procatartic, or more remote cauſes being truly weighed, which are wont to induce this diſtemper: and thirdly, and laſtly, from the ways of the Criſis, and Cures, by which this Diſeaſe, either ceaſes of its own accord, or is driven away, by the help of Medicines.

Firſt, Among the Signs, the Pulſe and Urine, deſerve the chief conſideration: The Pulſe, the cold fit coming on, is very rare, and low, which clearly argues, the Heat, and Vital Spirits in the Blood, to be as it were overwhelmed, by ſome crude matter, not eaſily combuſtible; juſt as a fire inkindled on the Hearth, and then covered with green wood, glows very ſlowly, and flames forth little, which afterwards, the crude humor being blown away, breaks forth into an open and very ſtrong flame: ſo alſo, the Blood, the crude matter, which is in Flux, being ſomthing overcome, or diſperſed, is very much inkindled; and what remains in the Blood is burnt up, when fermenting with the Particles of it, and induces a moſt violent heat, with thirſt; wherefore the Blood growing impetuouſly hot, is urged with a vehement, and moſt ſwift Pulſe: otherwiſe, it being too much heaped together in the Heart might cauſe the danger of choaking.

As to the Urine; that is imbued (eſpecially in a Tertian Feaver) with a deep colour, and as it were inflamed, alſo when the Contents are wanting; which ſeems to denote a ſcorching of the Blood, and too aduſt temper: moreover, in this Diſtemper, different from others, the Urine, for the moſt part is ill, when the Patient is pretty well, and on the contrary; foraſmuch as all the time of the intermiſſion, it is at a great diſtance from its natural ſtate, it becomes filled with a red colour, and thick, being expoſed to the cold, and lays down a plentiful ſediment, like to Bole-Armoniack; which is of neceſſity to be ſo done, becauſe in the whole interval of the remiſſion, the Feaveriſh matter is circulated with the Blood, and there riſes to maturity, with a ſecret increaſe. But in the middle of the fit, when the heat, and burning are at the greateſt, the Urine is laudable, and comes more near to the natural, *viz.* the Fermentative matter, being ſent to the Circumference of the Body.

The ſymptoms preceding the fit, confirm the ſame thing; for many hours before the fit begins, a perturbation of the humors, and blood, is perceived; an Headach, Vertigo, ſparkling of the Eyes, unquiet Sleep, *&c.* which plainly ſhew, the Blood firſt infected with the Fermenting matter, and the aſſault of the fit to be only ſo long deferred, until the maſs of the Blood is filled to a ſwelling up, with the ſame kind of matter: The fore-runners of the approach of the fit are, now a paleneſs at the ends of the Fingers, or Toes, or in the Nails, ſomtimes a Convulſion, or numneſs; now a coldneſs, and pain in the Loins and Thighs, and ſomtimes a ſhivering and trembling invade the whole Body, which clearly ſhew, the Blood in the Arteries and Veins, and alſo the thin Liquor in the Nervous parts, firſt to conceive the motion of Fermentation, and this Efferveſcency, not to be excited from any other fire-place, or mine. If it be objected, that the ſick are moſt often infeſted with Vomiting, about the time of the fit; from whence it may ſeem to be concluded, that the chiefeſt hurtful matter is eſtabliſhed in the Ventricle, and in the firſt paſſages, eſpecially, when this diſtemper is chiefly cured, by the timely taking of a Vomit; I confeſs, very great Vomitings are ſomtimes ſtirred up, in the fit of an intermitting Feaver; but this more often happens, becauſe in the Feaveriſh ſhivering, the membranes of the whole Body are pulled; wherefore the Ventricle alſo, as it is a very Nervous part, is diſtempered with a Convulſion, and having from thence contracted a Spaſm, caſts forth upwards whatſoever lurks in its boſom. Beſides, if that the Choler-bearing Veſſels, ſwell up with Bile or Choler, by the ſame Convulſion alſo of the Viſcera, the Bile is preſſed forth into the Duodenum by the Galiſh paſſage, and is emptied into the Ventricle, and there, by its fierceneſs, provokes yet to more cruel Vomiting, wherefore for the moſt part, the

the vomiting which is excited for this reaſon, follows the ſhaking only. But that the Choler was not in the Stomach before the fit troubled it, but only preſſed forth from the Choleduct paſſage, by the Spaſm and Convulſive motions of the Viſcera, and poured forth into the Ventricle, appears from hence, becauſe if a Vomit be given in the midſt of the interval, between the two fits, little or nothing of bilous matter will be drawn forth; beſides, this bitter humor is of that fierceneſs, that it cannot be long contained in the Ventricle, but preſently it will procure the pain of the Heart, and Vomiting. Beſides this ſort of Vomiting, excited in the ſhaking fit, ſomtimes a Vomiting is provoked in the midſt of the burning fit, or in the ſweat, the cauſe of which is, the redundancy of the biliſh humor in the Blood; of which if there be greater plenty, than what diluted with *Serum* may be ſent forth by Sweat, a great part of it, whilſt the Blood is circulated about the creviſes of the Liver, is laid aſide in the Choleduct Veſſels; which, when being filled to a diſtention, exonerate themſelves, and ſend away the Choler to the Inteſtines and Ventricle, and there a Convulſion being preſently ſtirred up, ſomtimes Vomiting is provoked, and ſomtimes the Belly becomes looſe, and the Stools liquid. In this Year 1657. I obſerved very many affected after this manner, for when after an hot and dry Summer, about the middle of Autumn, an Intermitting Feaver generally raged, the ſick were wont ſuddenly to grow very ill, in the middle of their hot fit, and ſomtimes alſo in their ſweating, and the Sweat being ſtruck in, to be taken with Swooning; but ſhortly after, when a Choleric Vomiting followed, they were eaſed.

Not only the ſigns and ſymptoms, but the Procatartic or more remote Cauſes of this Diſeaſe, clearly indicate, that it takes its riſe from the temper of the Blood being changed: becauſe Intermitting Feavers, are moſt frequent in the ſeaſon, and places, in which the Blood receives the greateſt alteration from the Air, *viz.* either in the Spring, when the vernal heat ſhutting out the Winters cold, cauſes the Blood, before benumed, and apt to be more ſlowly moved, to begin to flouriſh, and luxuriate in the Veſſels, and from thence, to get a bilous and hot temper: or in the Autumn, when the Blood being torrified, or roaſted by the Summers heat, and therefore its Spirits very much depreſſed, and Salt and Sulphur exalted, acquires now a ſharp and Choleric, now a binding and auſtere diſpoſition: wherefore, at this ſeaſon, Feavers, now Tertian, now Quartan, are frequent; beſides, in ſome places, there is that conſtitution of the Heaven, that on all men whatſoever, there comes either a Tertian or (more frequently) a Quartan Feaver; although in the firſt offices, where the Mine of the Diſeaſe is commonly believed to be lodged, there be no congeſtion of humors, by reaſon of an ill manner of living, or ſickly diſpoſition. Yea, they moſt eaſily fall into this Diſeaſe, who have their inwards firm and ſtrong, and who abound with a lively heat: on the contrary, thoſe who by reaſon of a weak Concoction, heap up Crudities in the firſt paſſages continually, that they are prone to the Dropſie, or Cachexia, remain free, for the moſt part, from this Diſtemper; to wit, the Blood being made more watery, (like Wine degenerated into a taſtleſs ſubſtance) is altogether unapt to be fermented.

No leſs, doth the Cure of Intermitting Feavers ſeem to prove this our Aſſertion, whether it be Natural and Critical, or Artificial, and performed by the help of Medicines. As to the firſt, Intermitting Feavers are wont to be terminated, after a twofold manner. The firſt is, when from the fits themſelves, the temper of the Blood is altered, and oft times is reduced into its Natural diſpoſition. For when in every coming of the fit, very much of Sulphur, and aduſt Salt is burnt out, and exhaled by Sweat, the Liquor of the Blood, by that means, becomes more temperate, and leſs torrid: wherefore, oftentimes this Diſeaſe is cured, at ſix or ſeven periods, and of its own accord ceaſes: but if it be longer protracted, and that the Blood being ſomwhat changed, from the ſharp and bilous temper, or diſpoſition, is not reſtored to its Natural temper, ſomtimes it degenerates into an Acid, Watery, and alſo Pontic or ſaltiſh temper, from whence a long Tertian Feaver paſſes into a Quotidian, or a Quartan; alſo oftentimes, becauſe the Blood is greatly depraved, by the long continuance of this Feaver, the Jaundies, or the Scurvy, or the Cachexia follow. The other manner, whereby this Diſeaſe is terminated, is, when the change of the Air, or the Country, brings a notable alteration of the Blood: for ſo Feavers begun at the times of the Equinoxes, are ended about the time of the Solſtices; alſo the ſick, traveling into another Region, often grow well.

As to the cure of it, by the Inſtitutions of the Medicines, it uſes to be done two ways, *viz.* Empirically, and Dogmatically; and in this Diſeaſe, Empirical remedies, ſought from Quack-ſalvers, and old Women, are more eſteemed, and oftentimes do more than the preſcriptions of Phyſicians, adminiſtred after the exact method of cureing.

Empirical Remedies, which are ſaid to cure Intermitting Feavers or Agues, are of that ſort, which drive away the approaching Fit, without any Evacuation: and are either taken inwardly, or are outwardly applyed, where the Pulſes chiefly beat, *viz.* For the moſt part, they are bound either to the region of the heart, or to the hand-wriſts, or to the ſoles of the feet; theſe ſometimes are ſo commonly known to help, that ſome have warranted the ſudden cure of this Diſeaſe, by theſe Remedies, under the pain of ſome Forfeiture: Wherefore it is worth our inquiry, how theſe operate, and by what way or means they ſtop the Feaveriſh acceſſions. It is clear, Firſt, that thoſe which are outwardly applyed, do immediatly impart force, and action to the Blood, and Spirits; and when they drive away the Fit, by preventing, without the Evacuation of humor, or any matter of neceſſity, the reaſon of this effect conſiſts only in this, that by the uſe of theſe ſort of Medicines, the turgeſcency or ſwelling up of the Blood, with the Feaveriſh matter, and Fermentation are ſtop'd; to wit, from the Medicine tyed about the Body, certain little Bodys, or Effluvia are communicated to the Blood, which do very much fix, and bind together the particles of it, or alſo, as it were precipitate them, by fuſing and ſhaking them; and by either way, the ſpontaneous growing hot of the Blood, is hindred: as when cold water is put into a boyling Pot, or as when Vinegar, or Alum is flung into new and working Beer, preſently Fermentation ceaſes, and the Liquor acquires a new taſt, and conſiſtency, whereby it becomes fit to be drunk, as if it had been kept to ripen a long time. But that theſe Ague-ſtoppers do work after this manner, it is plainly ſeen, becauſe thoſe which are of principal note, do excell in a Styptic, and binding force, or elſe with a precipitating virtue; hence Sea-ſalt, Nitre, Sal-gemmæ, the Juice of Plantan, Shepherds-burſe, any binding Herbs pounded with Vinegar, and the like, bound to the wriſts; the root of Yarrow, Tormentile, alſo Campher hung about the neck, are ſaid to take away this Diſeaſe: yea, thoſe alſo which are taken inwardly, are of the ſame rank; The Juice of Plantan, Red-roſe water, Alum, for that they fix, and conſtrain the Blood, a decoction of Piper, Sal Armoniac, or of Wormwood, Spirit of Vitrial, alſo a ſudden paſſion of anger, or fear, forasmuch as they precipitate the Blood, by fuſing and ſhaking it, do oftentimes hinder the Agues approach: even as the Concuſſion, and ſhaking much, any Liquour, or the infuſion of aſtringent things into it, hinder its ſpontaneous Effervеſcency and rage. It is uſual with ſome Empiricks, for the cure of Agues, to tye a little knot in a Linnen rag, or a piece of Paper roled up, ſo ſtrickly to the wriſts, preſſing hard upon the beating of the Pulſe, that the circulation of the Blood is ſomewhat hindred, and by this means, the Aguiſh fit coming on, is driven away. Very many by this way, I have none to be moſt certainly cured of a tedious ſickneſs; the reaſon of which ſeems to be, that whilſt the Blood is hindred from its motion in any part, it grows more tumultuous in the other parts; and ſo, by this perturbation, ſtirred up in the whole Blood, the ſpontaneous Effervеſcency of the Liquor, being about to follow, is hindred. But that the Fit, by this, or ony other means, being once hindred, does not afterwards eaſily return, the reaſon is; Becauſe, if this Feaveriſh, and depraved matter, be contained longer in the Blood, it is afterwards cocted, and in ſome meaſure ripened: and therefore the Blood does not (as before) altogether pervert, either this, or the proviſion coming to it anew, but begins to digeſt and aſſimilate it: beſides, when the Fit is once ſtop'd, its cuſtom is broke, by the inſtinct of which alone, Nature oftentimes repeats thoſe her Errors: for, as, when it has once made a fault, it is wont more readily to do ill after the ſame way; ſo when it once omits its fault, it more eaſily accuſtoms it ſelf to do better.

The dogmatical cure, is inſtituted for the moſt part, by Vomitory and Purging Medicines, alſo with the letting of Blood; with which the ſick are miſerably tormented, and the Diſeaſe ſeldom profligated or driven away; that deſervedly, this Diſtemper is called the ſhame of Phyſicians; but Tertian Feavers are ſometimes carried away by a Vomit given juſt before the coming of the Fit, which indeed happens (as I think) for the reaſon before mentioned. For I have ſaid, That the cauſe of a Tertian Feaver, is an evil diſpoſition of the Blood, whereby it paſſes into a ſour and bilous Nature; and therefore it doth not rightly aſſimilate the nutritious Juice brought to it, but changes

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it into a Fermentative matter; wherefore, if the Bile or Choler be copiously drawn forth of the Blood, that Cholerick and hot intemperance is very much taken away, and that Fermentative power ceases of it self, But Emetick Medicines do chiefly perform this, for if they operate strongly, a Convulsion is not only brought to the bottom of the Ventricle, but also the *Duodenum*, with an inverse motion, is drawn together towards the Pylorus, and the Choler by a continual thrusting forward, being squees'd forth from the Choleduct passage, is poured into the Ventricle, which is presently cast out by Vomit; which being copiously performed, the galish bladder is almost emptied, and after that, it becomes a receptacle, that draws forth, and separates the bilous humor, or the particles of adust Sulphur and Salt plentifully poured into the Blood; the next Fit sometimes is by this means prevented, not because the mine of the Disease is extirpated by Vomit, but because an Evacuation and motion is excited, contrary to the Feaverish motion, and for that reason, the spontaneous Effervescency of the Blood is prevented. Also by this means, sometimes the Disease is taken away after the Fit, because this way, the Blood is fully cleared from the bilous humor. It is worthy observation, that in a Quartan Feaver, Vomits profit nothing, and seldom in a Tertian, unless administred presently at the beginning, whilst the Feaverish disposition is yet light, and not fully confirmed.

Concerning Intermitting Feavers in general, there yet remain some Irregulars of them, to be explicated, which vary from the wonted manner: for unless these unusual appearances be solved, this our Hypothesis will seem to be defective, and to halt in one part. First therefore, they are wont somtimes to lack the cold or shaking fit. This Intermitting Feaver is frequent in Autumn, whose fits are wont to exercise the sick, only with heat, and that most Violent, and in many they come with great Vomiting, but no Sweat or Cold; then after four or five periods, upon the coming on of the fit, the sick are wont to be chil, and presently after to quake, and in the declination to sweat: The reason of this was, because, from the very hot Summer, the Constitution of the Blood was become sharp, and very much burnt: Wherefore, the Particles of the crude Juice, being commixed with it, were presently terrified or made hot, and scorched; that they did not at first, (like new Beer) grow hot with an Acrimony, and then afterwards blaze forth; but a turgescency being stirred up, (like dry wood laid upon a fire) presently the whole took fire, and broke forth into flames; but afterwards, the Liquor of the Blood being fired by several fits, became less torrid, that the depraved Alible Juice was not presently torrified, but passed into a Nitrous matter, and fermenting with a sharpness, which at first swelling up, induced the sense of cold to the whole Body. When the cold fit was begun, for the most part Sweat concluded it: which indeed hapned, because the Blood being made more watery, is more easily resolved into vapour, with the Feaverish matter, even as a watery Liquor is more easily drawn forth by distillation, than what is Oily, or of a more thick consistency.

It often happens, in the declination of this Disease, when the fits begin to lessen, that the sense of cold and shaking, by little and little are diminished, and at length vanish, and the fit only troubles the sick, with a light burning: The reason of which is, because at this time, the Blood being somwhat restored, towards its natural state, begins to concoct and ripen the crude juice; so that a great part of it is assimilated: but some Excrements, being heaped together in the Blood, bring forth as yet a light burning: but when the Feaverish Particles, do not participate of the Nitrous Acrimony, the Fermentation of the Blood is induced without any shivering, by which, what was extraneous burns forth, is either subdued, or carried forth of doors. Somtimes also, in the declination of this Disease, the fits appear without any burning, only with a light cold: The reason of which is, because the Morbific matter, being rather Nitrous, than Sulphureous, when it is in Flux, does somwhat blunt the Natural Heat; and by that means is dissipated, and vanishes, without any great deflagration.

There is yet a great doubt concerning the intervals of the periods, which somtimes seem to be double in the same Feaver, that the first Accession answers to the third, and either perhaps comes in the morning; and again the second to the fourth, and both happen in the Evening; and so forward: wherefore, the Feaver bearing this figure, is wont to be named a double Tertian, or Quartan, of which it doth not easily appear, how they should be done, if the fits depend upon the evil disposition of the Blood, and from thence on a Congestion to a Turgescency of the depraved Nourishing Juice: for which cause, they commonly affirm, that this double figure is

ſtirred up, or draws its original from a double Neſt, or Mine; but to me it ſeems moſt likely, that in this caſe, ſomtimes it happens for the Feaver to be ſimple, and of one kind, alſo its types or figures to be alike, and all congruous one to another, but the error to ariſe, becauſe the interſtitia of the periods, are not computed by hours, but days: For when as, the beginnings of the fits are diſtant one from another, not exactly twenty four hours, but either ſixteen, or thirty hours, in a Quotidian; and in a Tertian, not forty eight, but forty, or fifty ſix, more or leſs, or thereabouts; it comes to paſs, that every other fits, happen before, and the others after Noon. To which alſo may be added, that the different manner of eating, which the ſick uſe, very often produces great inequalities of figures: that ſomtimes the fit is redoubled twice in a day, as I have often obſerved in Cachectical men, or full of ill humors, and living diſorderly: but it doth not ſeldom happen, that Intermitting Feavers, repeat fits, which do neither obſerve the ſame diſtance, nor bear altogether the figure of the ſame mode. I have many times obſerved in a Quartan Feaver, that beſides the ſet comings or Acceſſions, returning on the fourth day, about the ſame hour; ſome wandring and uncertain fits, did infeſt the ſick; that ſomtimes on the day preceeding, the wonted fit, ſomtimes on that following it, another fit (tho lighter) was excited anew, with ſhivering, Heat, and Sweat, exactly like the figure of an Intermitting Feaver; and nevertheleſs, the primary Acceſſion returned at its accuſtomed time. This for the moſt part, is wont to happen, either from diet evilly inſtituted, chiefly from ſurfeit, and drinking of Wine; or elſe from Medicines wrongfully adminiſtred: The reaſon of which (unleſs I am deceived) conſiſts in this. The maſs of Blood, being wont to be filled to a ſwelling up, with the Fermentative matter, at a ſet time, often, by reaſon of ſome errors in eating and drinking, heaps up more matter, than can be eaſily diſſipated in one fit; and when it unequally Cooks the ſame Fermentative matter, it often happens, that it firſt ſhakes off its ſuperfluous, or more thin part, as it were by a certain skirmiſh, in a more light fit, but diſpels the more thick, (after the primary Acceſſion) as yet remaining in the Blood, by a Feaveriſh Fermentation ariſing anew. And when the fits, in an Intermitting Feaver, redouble after this manner, either become more remiſs, for that the ſame matter in either, is only divided; and eventilated by two acceſſions. Beſides, when this Fermentative matter, or Nutritious Juice, depraved in its circulation, is continued, partly in the Arteries and Veins, with the Blood, and partly in the Nervous ſtock, and ſolid parts, it may happen, that both humors do not ferment at once, but a great part of one may be diſperſed in one fit, and then a great part of the other, in another fit.

CHAP. IV.

Of the kinds of Intermitting Feavers, and first of a Tertian.

WE ſhall eaſily accommodate to our Hypotheſis, delivered in the former Chapter, concerning the nature and beginning of Intermitting Feavers, all the Phænomena which belong to it, and the reaſons of them. But as thoſe which are of this ſort, do not obſerve the ſame ſpace of Intermiſſion, or of return, and their figures, as to the appearances of their ſigns and ſymptoms, do not altogether happen after the ſame manner; therefore according to the diverſities of theſe, and eſpecially from the diſtance of the fits, the various ſpecies and differences of Intermitting Feavers, are aſſigned. The chiefeſt diviſion of them is, into Tertian, Quotidian, and Quartan: We ſhall here remark the chief things worthy of note concerning each of them.

It is called a Tertian Feaver, not which is accompliſhed at the diſtance of three days; but incluſively from the day in which one Fit begins, from thence the other returns on the third. In the mean time, if the Fits be ſometimes longer, *viz.* protracted almoſt to twenty four hours, and the Remiſſions anticipated alſo by their acceſſions, or comings of the Fits, the ſpace is oftentimes leſs by a night and a day. This Diſeaſe is commonly diſtinguiſhed into exquiſite and ſpurious; The exquiſite or exact Tertian Feaver is, which begins with a vehement ſhaking, to which ſucceeds a ſharp and biting heat, which goes off in ſweat, and its Fit is finiſhed in twelve hours, and that the perfect intermiſſion follows; In the ſpurious or baſtard Tertian, the cold and heat are more remiſs, but the Fit is often extended beyond twelve hours, yea often to eighteen or twenty. Theſe differ as to the various diſpoſition of the Blood, which is in the former more torrid and ſharp; therefore perverts the alible Juice from Crudity, towards an aduſtion, wherefore a more vehement Effervescency is ſtirred up; but as the matter more equally burns forth, it is ſooner finiſhed. In the latter, beſides the aduſtion, the Blood abounds with too much ſerous humidity, wherefore, the nouriſhing Juice degenerates into a Crude matter, and therefore leſs apt to be overcome, and to burn forth; wherefore, its Fit is gentler, and more unequal, but is not finiſhed but in a longer ſpace.

The Eſſence therefore of a Tertian Feaver conſiſts in this; That the Blood (like Beer brew'd with too high dry'd Mault) being too ſharp, and torrid, does not rightly ſubdue, and ripen the alible Juice, which is taken in from crude things eaten, but very much perverts it into a nitrous-ſulphurous matter; with which, when the maſs of Blood is filled to a ſwelling up, like new Beer ſtop'd up in Bottles, it conceives an heat: From the flux of this nitrous matter, which blunts the heat, and vital ſpirits, and pulls the nervous parts, firſt the cold, with ſhaking is excited; then the vital ſpirit geting ſtrength again, this matter growing hot in the Blood, begins to be ſubdued, and inkindled in the heart; from whoſe deflagration, an intenſe heat is diffuſed thorough the whole body; then its reliques being ſeparated, and involved with *ſerum*, are ſent away by ſweat.

This torrid Conſtitution of the Blood, conſiſts in this, That 'tis impregnated more than it ought, with particles of Sulphur and Salt; wherefore, the Procatartick cauſes, which diſpoſe to this Diſeaſe, are an hot and bilous temperament, a youthful age, hot dyet, as an immoderate uſe of Wine and ſpiced Meats, but eſpecially in the Spring, and autumnal ſeaſons of the year, when the Blood (as all vegetables) is apt to flower, and to ferment of its own accord. By reaſon of theſe occaſions, the liquor of the Blood, is want to be thorowly roaſted, and to be changed into a cholerick temper: and when it departs from its natural Diſpoſition, ſo much, that it perverts the nutritious Juice, into a matter plainly Fermentative, the beginning of this Feaver is induced; which ſometimes happens from this intemperance, being leaſurely increaſed and brought to the height; but more frequently, an evident cauſe raiſes up this diſpoſition

into

into act, and we aſcribe the origine of this Diſeaſe to ſome notable Accident. Wherefore, lying on the Ground, or taking cold after ſweating, or tranſpiration being any ways hindred; alſo a Surfit, or a perturbation of the Stomach, from any thing inordinately eaten; and laſtly, What things ſoever ſtir up an immoderate heat in the Blood, bring the lurking diſpoſition of this Diſeaſe into act: for that, from every ſuch occaſion, the nutritious Juice, being heaped in the Blood, and ſomewhat depraved, conceives a Flux, and departing from the reſt of the Blood, ferments with a nitrous ſharpneſs, then being inkindled and ſhaken by the Spirit, and vital heat, it induces the Fit, with a very ſtrong burning.

A Tertian Feaver, is wont to be more frequent in the Spring, at which time, the Blood is livelier and richer, and therefore more fitted for this kind of Feaveriſh diſtemper. If this Feaver being taken, be ended within a moderate time, tis commonly ſaid to be a Medicine, rather than a Diſeaſe; which is partly true, becauſe, by this means, the impurities of the Blood burn out, the obſtructions of the Viſcera are diſcharged, and in truth the whole body is ventilated, ſo that 'tis wholly freed from every Excrementitious matter, and the ſeminary of growing Diſeaſes. But if this Diſeaſe be long protracted, it becomes the cauſe of many Sickneſſes, and of a long want of Health. For from hence the maſs of the Blood is very much deprived of the vital Spirit, and (like Wine too much fermented) in a manner grows lifeleſs: wherefore the Jaundice, Scurvy, or Cachexia, follow this Feaver, being long er'e it be cured. For by its frequent Fits, the vital Spirit very much evaporates, and becauſe it is but little reſtored by things eaten, the Blood therefore becomes weaker, and almoſt without life: In the mean time, the particles of Salt, and Sulphur, are carried forth more, and exalted; from whence, the Blood is made ſharp, and ſalt, and ſo more unfit for Circulation and Tranſpiration.

Moreover, This Diſeaſe being long protracted, oftentimes changes its Figure, and from a Tertian Feaver, becomes either a Quotidian, or ſometimes a Quartan: then ſometimes from either, it returns into a Tertian. The reaſon of this is, the diſpoſition of the Blood being variouſly changed: which at firſt being ſharp, and bilous, had perverted the nutritious Juice, by that means, that it ariſe to a fulneſs of ſwelling upon the third day; afterwards, by the frequent Deflagration, becoming leſs ſharp, or in truth more wateriſh, it grows far weaker as to its Conſtitution, ſo that it doth very little, or not at all aſſimulate the nouriſhable humor, and ripen it, and by that means, the increaſe of the Fermentative matter is made ſooner, and the Fits return daily: or elſe, the Blood from a ſharp and bilous intemperance, (the conſtitution of the Heaven, or the year, bringing on this alteration) is changed into an auſtere, or ſaltiſh, and therefore more ſlowly perverts the nouriſhing Juice, and the increaſe of the Feaveriſh matter, gathering together more ſlowly, it doth not conceive the Fits till on the fourth day: but if either, by the means of Phyſick or Dyet, the temper of the Blood is reduced from either Dyſcraſie, towards a bilous, the periods alſo are altered, and they reſume the figure of a Tertian.

Certain ſymptoms are wont to come upon a Tertian Feaver, which are commonly eſteemed for the Criſes of this Diſeaſe; and in truth ſometimes, theſe appearing, the Diſtemper either clearly ceaſes, or begins to abate of its wonted fierceneſs. But theſe kind of ſigns, are chiefly theſe three, *viz.* The Eryſipelas, or an Eruption of pimples in the Lips, the yellow Jaundice, and an Inflamation, or ſwelling ſuddenly excited, in this or that part of the body: very often there happens after three or four Fits to the Sick, little ulcers, with a cruſty ſcab, to break forth about the Lips, and altho there be no coming away of any matter, in all the body beſide, yet from hence they preſage, that the Feaver is about to depart, which ſometimes the event proves true. But indeed ſometimes, I have obſerved, that the hoped for effect has not ſucceeded, but that the Feaver pertinaciouſly, and for a long while hath afflicted them, when their Lips have been broken out. But as to what reſpects this Symptom, it ſeems to ariſe, for that the Blood having got a more free Diaphoreſis, it not only thruſts forth adoors, the more thin, and ſmokie recrements, but alſo the more thick; and when the ſame, in other parts more eaſily exhale thorow the more open Pores, they ſtick in their paſſage about the Lips, by reaſon of the skin being more ſtrictly bound together; and becauſe the vaporous matter, abounds in particles of aduſt Salt, and Sulphur, being fixed in the skin, it there hinders Circulation, and therefore induces Puſtles, and little Ulcers; perhaps the more hot breath, which is breathed forth from the mouth, and noſtrils, may contribute ſomething to this Diſtemper, foraſmuch as it ſcorches, and burns the Blood,

Blood, and Juices flowing thither: wherefore, it may be ſaid, That this eruption of Puſtles, denotes only a more full Diaphoreſis in the whole, by which, the more thick, as well as the thin recrements of the aduſt Blood, evaporate forth of doors. For I have known in ſome, from a Tertian Feaver, little welks like the ſmall Pox to break out in their whole body, that if by this more plentiful Ventilation, as it were a purging, the Blood be ſo freed, that it recovers its priſtine diſpoſition, the Feaver is cured: But if (as ſometimes it happens) ſome recrements, tho more thick, break forth, yet others ſtay within, and ſtill cheriſh the Feaveriſh diſpoſition, thoſe little Ulcers, argue only a greater taint of the Blood, and pertinacy of the Diſeaſe, therefore it may be obſerved, when that ſcabs break out in the lips, if the Feaver does not preſently abate, that it will be more grievous, and tedious for the future.

Sometimes the yellow Jaundice comes upon a Tertian Feaver, and cures it; (which *Hippocrates* has alſo taken notice of) the reaſon of which is, becauſe, when the Blood has got a ſharp or bilous diſpoſition; that therefore it had perverted the alible Juice, and from thence had heaped together excrementitious matter, it is oftentimes freed by that Dyſcraſie, when by a ſudden Secretion, the recrements of aduſt Salt and Sulphur, are more plentiful purged forth. This the Choleduct veſſels being irritated by Phyſick, or of their own accord, and ſo pouring out plentifully the Bile, from the Blood, do often perform: becauſe Vomiting, Purging, and eſpecially a Diarrhea or Lask, very much conduce to the cure of this Diſeaſe, yea ſometimes, the Blood it ſelf, putting forth of its own accord, thruſts forth the bilous recrements, as its off-ſcourings, and in the circulating puts them forth in the skin, and ſo inducing the yellow Jaundice, cures this Feaver.

When an Inflamation, (as ſometimes tis wont) comes upon this Diſtemper, the Ague is commonly ſaid to fall down into the part diſtempered with the Tumor. But that by ſuch a breaking forth, this Diſeaſe is cured, 'tis no wonder; becauſe the Blood by this means continually lays aſide out of his boſom, the proviſion of the degenerate nutritious Juice, and transfers it to the diſtempered part; and therefore, the degenerate and fermentative matter in the maſs of Blood, does not eaſily ariſe to a fulneſs of ſwelling up: wherefore, the Belly being perpetually looſe, hath by degrees helped ſome, for that the Blood by this means, readily caſts forth its burthen, now growing low, and not having a more full increaſe yielded to it: ſometimes alſo, a Deafneſs ſuddenly ariſing, the Tertian Feaver has preſently ceaſed, to wit, by reaſon of a continual tranſlation of the Feaveriſh matter, from the boſom of the Blood, into the head.

If that the Tertian Feaver, within a ſhort time, neither by the free accord of Nature, declines by degrees, that it doth clearly ceaſe within ſeven or ten periods, nor is cured by any of the aforeſaid means, nor is removed by the help of Medicine, but that after ten or twelve Fits, the ſick are ſtill grievouſly afflicted, it will be a very hard task to cure it: becauſe the Blood, from the continual heaping of the Feaveriſh matter, and by the frequent burnings, becomes at length ſo depraved, that it concocts nothing truly for the nouriſhment of the Body, and for the ſuſtaining its ſtrength; neither is it able to ſhake thorowly out of its boſom, the impurities and excrements, whereby the Diſeaſe may make a Criſis or ſeparation, but in truth, the ſame growing in ſtrength every day, the Blood, beſides its Dyſcraſie or evil diſpoſition, begins to be hurt ſomewhat in its mixture; wherefore, more frequent Fits infeſt them, nor does a perfect Remiſſion come between, but that the ſick being very weak and languiſhing, are almoſt continually Feaveriſh, with thirſt and heat: when it is come to this paſs, unleſs they are ſuccour'd by remedies from Art, or that the change of the Place, and Air, bring timely help, this Diſeaſe often ends in death.

As to its cure: the method of healing is commonly directed to this one ſcope, to wit, that the mine of the Diſeaſe may be extirpated, and that the Feaveriſh matter may be eradicated out of our Body, without any cheriſher remaining, or fear of relapſing; wherefore, Vomits, and Purges are diligently Inſtituted, which when profiting nothing to the cure, but that the Patients ſtrength is very much broken, the ſick are left by the Phyſicians, and the buſineſs is wholly committed to Nature. The Intentions (as it ſeems to me) ought to be of this ſort: Firſt, a reſtitution of the Blood, to its natural Temper. Secondly, a prevention of the depravation of the nouriſhing Juice, as much as may be. Thirdly, an Inhibition of the Feaveriſh Fermentation, that the Fit may not be excited. And theſe Indications take place, not only in a Tertian Feaver, but in any other intermitting Feaver beſides: which yet are to be performed,

performed, not by the ſame ways and remedies, but by ſeveral, according to the diverſity of the Diſeaſe, of the condition of the ſick, and of the ſymptoms chiefly urging. However in the curing of this Diſeaſe, there is more to be attributed to Nature, and to a good order of Dyet, or way of Living, than to Phyſick.

1. Concerning the firſt Intention, to wit, that the Blood may be reduced to its natural Temper, Vomits, letting of Blood, and Purging are of great uſe: eſpecially, if they be celebrated in the beginning of the Diſeaſe. *Vomitories* help, both for that they Purge the Ventricle, that the firſt Concoction may be better performed, and by that means the nouriſhing Chyme may be more purely ſupplyed, for matter of the Blood; but chiefly, for that by plentifully preſſing forth the Bile, from the Choleduct paſſage, they empty the Galiſh bag, as by that means, the Bile is poured forth more full from the maſs of Blood; and ſo the Blood is purified, from the recrements of aduſt Salt and Sulphur. The opening of a Vein, cools and ventilates the Blood, as by that means, tis leſs torrified, or ſcorched, and is circulated more freely in the Veſſels, without danger of burning. Alſo Purging, plentifully draws forth, and by provoking expreſſes, or ſqueeſes out, the Bile, from the galiſh Veſſels, and conſequently from the maſs of Blood. For this end, (to wit, the reduction of the Blood) Digeſtives bring help, the more temperate Vinegars, or Acetous things, foraſmuch as they fuſe, and alter the Blood, and do attemper its fervor. Somtimes alſo, the change of the Soil, and Air, notably amends the evil conſtitution of the Blood, before all other Remedies whatſoever.

The ſecond Intention, is excellently performed, by Dyet, and an exact manner of living; which in this Diſeaſe ought to be ſlender and ſparing: wherefore it is commonly ſaid, Starving is the beſt Remedy for this Diſeaſe: and it appears by common experience, that by a more ſpare eating, the coming of the Ague fit, is very often prolonged, beyond its wonted Cuſtom. There are eſpecially two things to be obſerved, concerning Eating and Drinking: The firſt, that the food be ſlender, that nothing Sulphureous or Spirituous be given, for ſo the Conflagration of the Blood will be leſſened; then ſecondly, that the Fit approaching, or urging, nothing of Aliment be taken, wherefore, in faſting the Fit is lighter, and ſooner finiſhed.

As to the third thing propoſed; the Inhibition of the Feaveriſh Fit, is inſtituted by Remedies, which ſtay the Fermentation of the Blood. But tho this Remedy ſeems Empirical, and unmethodical, and very failable to Phyſicians, yet I have found theſe Feavers to be very often cured by this means, when Medicines have profited nothing: What they are, and by what means, without the ſuſpicion of Witchcraft, they afford help, for the curing this Diſeaſe, is before noted. We ſhall here only advertiſe you, that the uſe of theſe is moſt profitable after Phyſick, and opening a Vein, if there be need of it; and unleſs theſe be rightly performed before-hand, thoſe other rarely ſtop the Fit. But Vomiting, Purging, and breathing a Vein, unleſs they be preſently celebrated after the beginning, yield little help, yea, more often are wont to hinder: For whilſt the Blood is ſtrong in vital ſpirit, its evil diſpoſition, may with eaſie labour be corrected, or amended: wherefore, if the Bile, about the beginning, be copiouſly drawn forth, or the Blood eventilated, it is reduced to its natural Complexion; but afterwards, in the progreſs of this Diſeaſe (the Spirit being now very much exhauſted, and the Salt and Sulphur too much exalted) if theſe kind of Evacuations be adminiſtred, they do more debilitate the diſpoſition of the Blood: and therefore it is clear by obſervation, that the Tertian Feaver, is rarely or never cured, by theſe Remedies late adminiſtred, and often paſſes into a Quotidian. I my ſelf have known ſome, in the Spring time, being ſtrong in very good health, from a more ſtrong Emetick taken for prevention ſake, cauſing a violence by the Evacuation, to have preſently fallen into a Tertian Feaver; and others, for ſome time cured of this Feaver, when they had taken a ſtrong Purge, for the carrying away of the remains of the Feaveriſh matter, upon it to have fallen into a Relapſe. It may be readily ſaid, that the mine of the Diſeaſe, being before at quiet, was ſtirred up, and brought into Act, after this manner by the Medicine: But if you conſider this thing rightly, it may rather be ſaid, that from the ſtrong Medicine, the diſpoſition of the Blood was very much hurt, and when at firſt it was prone to a bilous Dyſcraſie, that it hardly did aſſimilate the alible Juice, from this evident cauſe, it forthwith degenerated, that it wholy perverted the Nutriment, into a Fermentative matter, and ſo conceived the Feaveriſh diſpoſition. It is a common opinion, that a Tertian Feaver can ſcarce be cured, without a Vomit, wherefore ſome Medicaſters, are wont under the pretext of the neceſſity, to give to all whatſoever, labouring

labouring with this Diſeaſe (tho languiſhing and weak) an Emetick Medicine not without great danger of life: and thoſe whom they judge wholy unfit for ſuch a Medicine, they leave as not eaſily cureable to Nature. But (as I have often found the contrary by experience) this ſort of practice is evilly inſtituted; yea, I rather judge, for the cureing of a Tertian Feaver that Vomits are rarely or never to be required, unleſs in a ſtrong Body, and very eaſily prone to Vomiting, and when the Ventricle happens to be burthened, with excrementitious matter, but inſtead of it, that a gentle Purge, by which the load of the humors may be pleaſantly brought away, may be of better uſe: becauſe, a Purge in this caſe, doth the ſame thing as a Vomit, to wit, it evacuates the choleduct Veſſels, that the Bile, being plentifully exhauſted from the Blood, the Feaveriſh Dyſcraſie is mended. But when the galiſh humor, being emptied forth into the Ventricle, is caſt out upwards, from thence there is great hurt brought to the ſtomach, and a mighty perturbation excited in the whole Body: But if that humour be inticed downwards by a gentle Purge, it is ſent forth of doors, without any trouble. Then, if to a gentle Purge, once or twice repeated, be added a very ſlender dyet, without fleſh, it often anſwers the preſervatory Indication, that there needs no other Remedies, for the taking away the cauſe of this Diſeaſe; but that theſe being rightly performed, ſhall render beneficial thoſe things, which being either inwardly taken, or outwardly applyed, ſtop the Feaveriſh acceſſion. By this ſort of plain and eaſie inſtitution of Medicine, *viz.* A Purge of the infuſion of Senna, and Rhubarb, a ſlender dyet, and a Febrifuge or Ague-reſiſting Topick, laid either to the wriſts, or the breaſt, I have known very often, and in a very ſhort time, Tertian Feavers cured, without the uſe of any other deſtroying Phyſick: yea, a thin dyet only, with Amulets timely adminiſtred, hath very happily cured Big-bellied women, and alſo very weak old men, whoſe ſtrength could not bear Purging. I have ſo often made tryal of this method, with good ſucceſs, that I doubt not, but that a Tertian Feaver, may as eaſily be cured, as any other Diſeaſe, if it be at the begining handled after this manner, *viz.* before the temper of the Blood be more hurt, by an evil manner of Dyet, or by Medicine untowardly adminiſtred. For the truth of this thing, I will relate this following Hiſtory.

A certain noble young man, indued with a bilous Temper, had caught an intermitting Tertian Feaver; upon the approach of the Fit, he Vomited forth much yellow and greeniſh Choler, then he was troubled moſt grievouſly, for many hours, with a great pain of the Heart, and moſt ſtrong Heat and Thirſt. On the day of the intermiſſion there was taken from this perſon, with whom I was by chance, by my preſcription, eight ounces of Blood, and in the afternoon was given an Emollient Glyſter, he alſo uſed a moſt ſlender Dyet, (*viz.* only made of Barly) He took every night going to ſleep, this Opiate, *viz.* Conſerve of Roſes vitriolated half a dram, of Diaſcordium a ſcruple, alſo every morning of the Salt of Wormwood a ſcruple, in a ſpoonful of the Juice of Orange: but when theſe did not ſucceed (for the Fit returned ſomwhat more remiſs, but with cruel Vomiting, as at firſt) beſides, for that this ſick perſon, extreamly abhor'd a Vomitory Medicine, (becauſe not long before this, from a very gentle Emetick, he had Vomited almoſt thirty times, until being diſtempered with the Cramp, and Convulſions, he was brought into great weakneſs, with hazard of his life) therefore, the day following the aforeſaid Fit, I gave him a Potion of an infuſion of Senna, Rhubarb, and yellow Sanders, with Salt of Wormwood, in Spring-water, by which he was Purged ten times, with eaſe: In the morning after, and three hours before he expected the Fit, I put to his wriſts an Ague-reſiſting Medicine, and took from him ſix ounces of Blood, by which means, he miſt his Feaveriſh Fit, and then being again Purged after the ſame manuer, became perfectly well.

If that the Tertian Feaver, by reaſon of the evil Conſtitution of the ſick, or becauſe of errors in Dyet, or committed by Phyſick, hath more deeply rooted it ſelf, that after a long ſickneſs, the Fits ſtill grow worſe, and the ſick extreamly languiſh, with want of Strength, Thirſt, and almoſt continual Heat, want of Appetite, wakeings, weak Pulſe, high colour'd Urine, and very full of Contents, the Curatory method ought to be a little otherways inſtituted; In this caſe, firſt it is to be endeavour'd, that the Dyſcraſie of the Blood, may be taken away; wherefore, the ſick are to be fed, with ſlender Aliments only, as Barly broth, or Grewel, with opening Roots boiled in it, (fleſh-broth being wholly laid aſide) the Belly is to be kept looſe, (if need be) with the uſe of Emollient Clyſters; beſides (Purges being omitted) only digeſtive Medicines, which fuſe the Blood, and bring away gently the ſerous Impurities by

Urine, alſo comforting Remedies, which corroborate the Viſcera, and cheriſh the Spirits, are chiefly to be inſiſted on. To this end, Apozems are fitly to be prepared, of Herbs, and Roots gently Diuretic, alſo Opiats help very much, of temperate Conſerves, with *Sal* Nitre, or the fixed Salt of Herbs, with ſhelly powders, and the Spirit of Vitriol mixed together. When the diſpoſition of the Blood is ſomwhat mended, that the Urine is clearer, and leſs coloured, alſo ſleep quieter, with a remiſſion of thirſt, and heat following; then may be profitably adminiſtred, Remedies to ſtop the Feaveriſh fit: wherefore Ague-reſiſting Amulets may be applyed to the Wriſts or to the Soles of the Feet; alſo the powder of Peruvian Bark, or of ſomthing inſtead of it, or alſo of the Barks of the Aſh-Tree, Tamarisk, or Gentian, with Salts mixed with them, and drunk in White-Wine: after the comings of the fits are taken away, and the ſick being to get ſtrength, and deſire Food, and in ſome meaſure to digeſt it, gentle Purges may be of uſe: but let the ſick ſtill abſtain, from a more plentiful Diet, or participating of Fleſh, and they will ſhortly after recover perfect Health without any violent Purge or Phlebotomy.

Chap. V.

Of the Quotidian Intermitting Feaver.

BEcauſe of its affinity to the Tertian Feaver, and likeneſs of fits, the Quotidian (or dayly) Feaver comes next, *viz.* whoſe Acceſſion is wont to return every day. It is the opinion of ſome, that this ſort of Feaver, is only a double Tertian, and doth ariſe from a diſperſed matter, having gotten a twofold Neſt; to which I cannot aſſent, and I ſuppoſe its begining is to be attributed, to a peculiar Dyſcraſie of the Blood. In this the ſymptoms of cold and heat, are more remiſs, but its fit is longer continued, and oftentimes it is wont to laſt eighteen or twenty hours: This Feaver for the moſt part follows a Tertian, for when the Vital Spirit is very much flown away, by the frequent deflagration of the Blood, and (the Feaveriſh diſpoſition ſtill remaining) the Blood is made weaker, it doth not concoct the nouriſhing Juice, or ripen it, but perverts almoſt the whole into a Fermentative matter; wherefore it comes ſooner to its increaſe, and is gathered together to a plenitude of ſwelling up, within double the time, than at firſt. But becauſe the congeſted matter, participates equally of crudity, and aduſtion, therefore the heat of the burning is leſſer, and more unequal, and (like green wood laid on the fire) ſlowly burns; for which reaſon the fit endures longer.

Somtimes it happens, that a Quotidian Feaver, doth ariſe without a Tertian going before, *viz.* when a Feaveriſh diſpoſition, falls upon a Cacochymic Body, or full of evil humors, and ſtuffed with depraved Juices; for then the Blood, being poor in Spirits, perverts in a greater meaſure the nutritious Juice, and in a ſhorter time, gathers to a fulneſs of ſwelling up: But that which begins an every days Ague, oftentimes changes its figure, and becomes a Tertian; juſt as a Tertian, often goes into a Quotidian, becauſe between theſe Feavers, and their cauſes, there is a great vicinity; and the conſtitution of the Blood being a little changed, it makes a tranſition from one to another. A Quotidian Intermitting Feaver, is not ſo eaſily cured as a Tertian: For whether it comes at firſt ſimple, or follows upon another Intermitting Feaver, it is ſtill excited from a ſtronger cauſe, and argues a greater dyſcraſie of the Blood, which will not preſently give way to Remedies. But alſo, if this Feaver be of long continuance, or comes upon another Chronical Diſeaſe, it has moſt often adjoyned to it, beſides the taint of the Blood, the infirmities of the inwards: to wit, the Blood being ſpoiled, eaſily affixeth its impurities, by degrees heaped up, on the Viſcera, whilſt it paſſes through their Meanders: from hence it is, that in a Quotidian Feaver, the weight of the Ventricle, an extenſion of the Hypochondria, Obſtructions, or Tumors, now of the Liver, now of the Spleen, or Meſentery, are joyned together; but theſe kind of diſtempers, are not the cauſe of the Feaver, (as is commonly believed) but only its product. Wherefore, in this Feaver, beſides the ſimple method

of

of Cure, which is shown in the Tertian, many other intentions or coindications, come under consideration: to wit, that the Ventricle be cleansed from its load of humors, the stuffings of the Inwards freed, Infirmities corroborated; and that together with these, the Dyscrasie of the Blood may be mended, and the Accessions of the Feaver may be restrained, must by all means be endeavoured; from whence, by reason of these kind of various intentions, we come to the Cure by a longer way: In this case, Vomits (if strength will bear them) are of benefit before all other Medicines: also Purges, whereby the assiduous supply of Excrementitious matter, may be drawn forth, are often to be repeated: Besides these, digestive Remedies, openers of Obstructions, such as restore the Ferment of the Viscera, and Blood, and correct their evil dispositions, are frequently to be administred. Wherefore, the fixed Salts of Herbs, and their Extracts, Acid Spirits of Minerals, and somtimes preparations of Steel, do very much help: concerning these main things, the task will be hard, when by reason of the manifold evil, many things are to be done together, yet by reason of the assiduity of the Feaverish fit, there is leisure for the sick to use few only. In Distempers so complicated, tho the reason of the method requires, the impediments to be first removed, and then to Cure the Disease, yet I have known, this kind of Feaver, beset with many other distempers, in a Body full of humors, often Cured, without method, and by an Empirical way; *viz.* after a light provision of the whole, Ague-resisting Remedies being outwardly applyed, have at first stopped the Feaverish fit, that then there was time, for the Curing the other distempers, and more happy occasions of healing were granted. I lately visited a Noble Lady, who being long indued with a Cachectical habit of Body, a month after her lying in, being weak and languishing, was taken with a quotidian Intermitting Feaver; after six or seven fits of it, her strength was so much cast down, that she could scarce rise out of, or sit up in her Bed; nor able to take never so little Food, tho very slender, but upon it, most grievous molestations were raised up, in her stomach; besides, the Region of her Ventricle, and left Hypochondrium, was wholly beset, with a hard shining tumor, and cruelly painful: by reason of her strength being mightily cast down, there was no place left for Evacuation, but the use of Clysters; also her Stomach, being very weak, loathed all other Remedies, unless very grateful, and only in a very small quantity. In this difficult case, circumscribed between narrow limits of Curing, I counselled these few things, to wit, that twice in a day, she should take this mixture, *viz.* The magisterial water of Earth-worms two Ounces, of Elixer Proprietatis twelve drops. Moreover, I ordered to be applyed to her Ventricle, a Fomentation, of the Leaves of Sea-Wormwood, Centaury, Southernwood, with the Roots of Gentian, boiled in White-Wine, in an open Vessel: also, that after the Fomentation, a Cake of Tosted-Bread, and dipped in the same Liquor, should be worn upon her Stomach; besides, Ague-resisting Medicines were ordered for her wrists; and with these Remedies only, she mist her Ague fit, on the third day, and remained free from it afterwards; then, by the use of Chalybeat Remedies, she became perfectly well, within a short time.

Chap. VI.

Of a Quartan Feaver.

In a Quartan Feaver, the period is longer than in the reſt; to wit, which is extended to the fourth day incluſively; alſo its continuance uſes to be longer, and its cure harder: becauſe this Diſeaſe is protracted for many months, yea, oftentimes for years, and ſeldom, or ſcarce at all, is cured by Medicines.

The Fit, for the moſt part, begins with cold, and ſhaking, to which a very troubleſome heat ſucceeds, but more remiſs than in a Tertian: Sweat for the moſt part concludes the Fit. At the firſt coming of the Diſeaſe, the Fits are more grievous, and very infeſtous, and keep the ſick in their Beds; yea, they make them loſe their ſtrength, and vigour of Body: But afterwards, the trouble is more eaſily born, ſo that the Fits are ſuffer'd out of Bed, and ſomtimes in a Journy, or being about any buſineſs. If it continue long, it induces the Scurvy, or Hypochondriac diſtemper, and involves men in an unhealthful condition.

The cauſes which diſpoſe to this Diſeaſe, are firſt, the conſtitution of the Soil and Air, becauſe this Diſtemper is proper to the fall of the Leaf, or Autumn, that you rarely find this Feaver to begin, but about that time: alſo in ſome places, eſpecially about the Sea-coaſts, this uſes to be general, or common to the Region, and to come upon thoſe living there, or Strangers coming thither from elſewhere. A declining age, which is paſt its *acme* or height, alſo a melancholick Temper, and which, by reaſon of an ill manner of living, is obnoxious to the Hypochondriac Diſtemper, cauſe this: beſides, long Feavers of another kind, and Chronical Diſeaſes, often paſs into a Quartan Feaver.

According to theſe poſitions, and rightly weighed, it may be ſaid, that a Quartan Feaver, even as the other intermitting Feavers, depends upon a vitious diſpoſition of the Blood; to wit, becauſe the nutritious Juice, being by degrees delated into the Veſſels, is perverted into a Fermentative matter; and the efferveſcency of this, heaped up even to a fulneſs of ſwelling over, conſtitutes the Fit of the Quartan Feaver. But as in this Feaver, there are ſome things, which are peculiar from the reſt, we will inquire, what kind of Dyſcraſie of the Blood it is in this Diſeaſe, diſtinct from the others, and by what means it excites, the very remarkable Symptoms.

The opinion, which is commonly had concerning this thing, is very far from truth: almoſt by the conſent of all, the Eſſence and beginning of a Quartan Feaver, is aſcribed to a melancholick humour, heaped up ſomwhere in the firſt paſſages, and there periodically Putrifying. Inſtead of this, we affirm, that in this Diſeaſe, the Liquor of the Blood, doth paſs from a ſweet, ſpirituous, and balſamick, into an acid, and ſomwhat auſtere Nature, like Wine growing ſowre: to wit, there is too great a want of Spirits, and the Terreſtrial, or Tartareous part of the Blood, (which conſiſts chiefly of Salt, and Earth) is too much exalted, and being carried forth into a Flux, induces the ſourneſs of the maſs of Blood. Even as Beer, being diſturbed by Thunder, and infected with a troubled lee or dregs, grows ſour. The Blood, after this manner degenerated, from its native diſpoſition, doth not rightly dreſs the alible Juice, and aſſimilate it to it ſelf, but perverts it into an extraneous matter; with which, when it is ſatisfied to a fulneſs, in the veſſels, and the nervous parts are watered by the Juice, from thence ariſing, a Flux of this matter, and as it were a ſpontaneous effervency follows, by which indeed, the Feaveriſh Fit is induced, with ſhivering and heat, as is wont to be in a Tertian.

In a Quartan Feaver, the periods have longer intervals, becauſe, when the Dyſcraſie of the Blood is become ſouriſh, and therefore leſs violent and hot, it perverts the alible Juice without ſtrife, or tumult: wherefore, it aſſimilates ſome of it, and the depravation of the reſt, does not ſo far recede from its natural ſtate, as in a Tertian, and from hence, its congeſtion to a plenitude, is made longer, and almoſt in another half of that time, in which a Tertian riſes up to a Turgeſcency: And therefore, thoſe taken with this Feaver, are indifferently well, and are ſtrong; which is a ſign, that the nutritious

Juice

Juice is leſs depraved; alſo, the Fits are made without cruel burning, becauſe the nutritious humor, is perverted into a fermentative matter, without great aduſtion.

But why this Diſeaſe is ſo hard to be cured, and ſo pertinaciouſly infeſts the ſick, the cauſe is, the melancholic conſtitution of the Blood, which is not eaſily to be taken away, and yields almoſt to no Remedies. The cholerick diſpoſition of the Blood, is mended by the frequent Deflagration, and ceaſes often of its own accord, even as too rich Wines are depreſſed, by their own growing hot, and are wont to be reduced into their due ſtate: but this melancholick Dyſcraſie of the Blood, in which, with a want and defect of Spirits, Salt and Earth are too much exalted, (as when Wines grow four) is moſt hard to be reſtored, and is almoſt of the ſame labour and difficulty, as to put again life, and a vinous Spirit, into Vinegar: For that the Blood, depraved after this manner, may be reſtored, it will be needful, that its whole maſs ſhould be volatiliſed, and as it were made Spiritual anew: wherefore, in this caſe, evacuations profit not a jot, yea, by more depauperating the Blood, oftentimes the ſtrength is caſt down, beyond help: but they had need to exalt, and make volatile what is fixed, and to promote a Tranſpiration, or Spiritualiſation, in the whole maſs of Blood: From hence it is, that in this Diſeaſe, the change of the Air and Region, moſt often brings help, before all other Remedies: For the Spring following, oftentimes takes away thoſe Quartan Feavers, that had ariſen the Autumn before: which without doubt happens, becauſe the changed condition of the Air, is wont to alter for the better, the evil diſpoſition of the Blood: alſo for the ſame reaſon, the change of the place, moſt often cures this Diſtemper, inexpugnable to all Phyſick.

If it be demanded, wherefore this Diſeaſe chiefly begins in the Autumn; and rarely in the Spring, or Summer time; I ſay, the Autumnal time doth moſt fitly produce this kind of Feaveriſh diſpoſition of the Blood, for when very much of the Spirit, and Sulphur, hath flown away by the Summers heat, and that what is left begins to be bound up by the cold; the Liquor of the Blood, (as Wine growing four by too much heat) eaſily degenerates into a ſaltiſh, and acidulous or ſharp Nature: This alſo, the Sea air, by infecting the Blood and Spirits, with ſaline Vapours falling on them, eaſily procures: yea, alſo the affinity of this Diſeaſe, with the Scurvy, and Hypochondriac diſtemper, plainly ſhews, the evil diſpoſition of the Blood to be in fault, whereby it becomes ſalt, and earthy, with the want of Spirit.

Concerning Quartan Feavers, the laſt year was ſo abundantly fruitful of obſervations, that many might collect by ocular Inſpection, whatever belong to this Diſeaſe; for when the moſt hot Summer was paſt, about the end of it, an Epidemical Feaver (of which in another place you ſhall have a deſcription) followed; then the Autumn coming on, when that Diſeaſe had ceaſed, a Quartan Feaver began very much to rage; that in very many places, the fourth part of the people was taken with it: neither did it only infeſt old men, ſplenitick and melancholick men, but of every age and temper, alſo Infants, Children, and young men ordinarily: which was clearly a ſign, that this Diſtemper had drawn its riſe, not from a melancholick humour, heaped up, by the default of the Spleen, but from the Dyſcraſie of the Blood, brought in, through the intemperance of the year: for the maſs of the Blood, after too great heats, even as Wines after immoderate effervеſcencies, was made fit to grow ſomwhat four, or to get an auſtere diſpoſition, and ſo alſo prone to this ſort of Feaver, as is already ſhewed.

If the Remedies, which for the Curing of this, have been made tryal of, both by Phyſicians and Empericks, were collected together, their deſcription would ſwell into a great Volumn; but altho there is inſtituted, a manifold proviſion of Medicine, againſt this evil, yet very few are cured in the Autumn. In ſome, about the begining of their ſickneſs, before the Diſeaſe has taken too deep root, a Vomit hath brought help; but in moſt, all manner of Cathartics, tho an hundred times repeated, have profited nothing. In whom the evil had deeply implanted it ſelf, the ſick received no help, from the moſt ſtudied Medicines made uſe of all the Autumn. But when at this time, I perceived the ordinary method of Medicine, was adminiſtred in vain, I propoſed to a Noble Virgin, requiring a ſudden Cure, by any means, to be performed, that if ſhe would indure a Flux at the Mouth, for ſome days, from a Mineral Medicine, by that means, it might be hoped, that the Diſeaſe would be profligated. When ſhe had readily aſſented to this, I gave her a gentle, and very ſafe Medicine, by which a light ſpitting only was provoked, and that finiſhed within twelve days: As ſoon as the Salivation began, ſhe miſt her fits, but at thoſe times they were wont to come, ſhe felt a perturbation in her whole Body, with an oppreſſion of the Heart, and dread of

of ſwooning, but after the ſpitting was finiſhed, ſhe appear'd very well; and when again after two months ſpace, ſhe was troubled with ſome light fits of this Diſeaſe, from an Emetick pouder, twice or thrice taken, ſhe was wholly cured without relapsing.

After the winter Solſtice, this Diſeaſe began to rage leſs, and to ceaſe in ſome of its own accord, and in many others, to be eaſily expung'd by the uſe of Phyſick: becauſe at this time, the Dyſcraſie of the Blood, contracted by the Summers heat, is wont to be blotted out leiſurely, by reaſon of the cold of the Winter, and the maſs of Blood growing old, as it were to put off its old ſpoils, and to be reduced towards its natural State. But thoſe, who were of a melancholick temper, or had their viſcera, and eſpecially the Spleen, evilly affected, or that uſed an ill manner of Dyet, received no change at this Tropick, but to the next period of the year, *viz.* to the vernal Equinox, or the Spring, kept the Diſeaſe; and then in moſt, the Blood being either reſtored of it ſelf, or its intemperance more eaſily mended by the uſe of Remedies, this Diſtemper was ſeen to be overcome: But in the mean time, many old men, and ſuch as were full of evil humours, or otherways unhealthy, ordinarily dyed, in all that ſpace of time, of this Diſeaſe; alſo ſome liv'd, who could not ſhake off its yoak, tho the Summer Solſtice were paſt. But altho very many had labour'd with this Feaver, as it were Epidemical, almoſt thorow the whole year, yet none (that I know) contracted it firſt in the Spring, and very few grew well of it during the Autumn, that in truth, I do not doubt, the Dyſcraſie of the Blood, to be the cauſe of this, and the cure to conſiſt in the change of it.

The Remedies, which moſt often brought help, (as appeared at leaſt to our obſervation) were of this ſort, which did reſtrain the Feaveriſh Fit: for the evils of the diſpoſition of the Blood, being ſomwhat mended, by the time of the year, being changed, if now the habitual cuſtom of the Fits were broken off, Nature recollected her ſelf, and eaſily recover'd the priſtine ſtate of health, by her own endeavour. And this kind of intention, (to wit, the inhibition of the Fits) tho ſomtimes performed by Vomits, given a little before the coming of the Fit, (for theſe did not rarely ſtop the Feaveriſh motion of the Blood, by raiſing up another motion contrary to this) yet this Indication is far more certainly, and indeed happily effected, by the uſe of thoſe kind of Medicines, which do not altogether evacuate from the Viſcera, but induce, either a certain fixation to the Blood, or a precipitation of the Feaveriſh matter, for a time. Wherefore, thoſe whom I undertook to cure, in the Spring, and afterwards; I handled (and in moſt with good ſucceſs) with this method; a proviſion being made of the whole, ſomtimes with an Emetic Medicine, ſomtimes with a Solutive; I was wont three hours before the Fit, to lay a peculiar Ague-Medicine to the wriſts, and together, to give them to drink in Sack, an Ague-reſiſting pouder, and to order the ſick to be kept in Bed in a gentle ſweat: It ſeldom hapned, but at the firſt, or ſecond time, the Feaveriſh Fit, was by this means reſtrained, and then, by the ſame Remedy, ſomtimes reiterated, the Diſeaſe at laſt wholly ceaſed. To this kind of practice, (beſides our experience) the uſe of the pouder, of a certain Bark, brought of late from the Indies, ſeems to give ſome Faith, and approbation; which is ſaid, moſt certainly to cure this Diſeaſe; but the vertue, or operation of this, without any evacuation, conſiſts in this only, that it hinders the coming of the Feaveriſh Fits.

Concerning this Peruvian Bark, becauſe of late it hath begun to be in uſe, there are ſome things to be ſaid, which offer themſelves to common obſervation. The common manner of exhibiting this is, that two drams of it beaten to pouder, be infuſed in Sack, or Whitewine, in an open Glaſs, for two hours, and then upon the coming of the Fit, the Patient being put to Bed, that the liquor and pouder be drunk up. This potion often takes away the approaching Fit, yet oftentimes tho taken after the wonted manner, it prevents the next, however, either in the firſt, ſecond, or third period, the Fit is inhibited, and the Diſeaſe ſeems to be cured, it is often wont to return, within twenty or thirty days; then this pouder being again exhibited, the Diſeaſe is for a time deferred about the ſame ſpace, and by this means, I have known many ſick of a Quartan, to have ſuffered ſome few Fits only, a whole Autumn, and Winter, and ſo to have detained the enemy in his precincts, till the Spring coming on, the diſpoſition of the Blood is altered, for the better, by the help of the time of year, and of other Phyſick, and ſo this diſtemper vaniſhes by degrees. Thoſe who by this means, have procured theſe frequent truces of the Quartan, have liv'd chearful, lively, and ready for any buſineſs, when otherwiſe, being weak, and pale, they were brought into languiſhment,

ment, and a vitious habit of Body: ſcarce one of an hundred, hath tryed this Medicine in vain, yea, if but half, or a leſſer quantity, *viz.* the weight of but one dram, taken, it very often takes away the Fits, and ſuſpends the ſame, a ſhorter ſpace only; neither is it any matter, whether it be taken in ſtrong, or ſmall Wine, unleſs with the reſpect, to the diſpoſition of the ſick: becauſe in a more hot temper, it may be profitably taken in diſtilled Water, or Whey; alſo, a clear infuſion of it, the more thick ſubſtance being caſt away, produces the like effect, but of ſhorter durance: I have taken care to reduce this powder into Pills, with the mucilage of Tragacanth, with a little coſt to the ſick, to be given to ſome; after what manner ſoever it is taken, unleſs, to thoſe loathing and abhorring every Medicine, it cauſes no manifeſt evacuation, and takes away the Fit, almoſt from all; neither is it only in a Quartan Feaver, but in the other kinds of intermitting Feavers, to wit, in every one where there is any remiſſion coming between, given with good ſucceſs. It is commonly ordered, that a gentle Purge ſhould be taken before this, but in ſome who are very weak, and keep their Beds, this powder being taken carefully, without any previous Medicine, hath procured laudable effects. In the mean time, I will ingeniouſly confeſs, that I have not ſeen an intermitting Feaver quite cured, by this Bark, once taken: nay, rather the Fits not only of a Quartan, but of a Tertian, and Quotidian Feaver, wholly overcome eaſily by other Remedies, ſeeming to be driven away by this powder, have conſtantly return'd after a ſhort time. For this Reaſon, they who ſuppreſs intermitting Feavers, otherways eaſily curable, no neceſſity urging them, by this Medicine, for a little while, only ſeem to inſtitute a deceitful Medicine, and do no more than thoſe, who skin over a rotten Ulcer, which will ſhortly break out again; in truth, in ſome caſes, the uſe of this will be requiſite, *viz.* when by the too great aſſiduity of the Fits, the ſpirits of the ſick are caſt down, truces are by this means procured, by which Nature may recollect her ſelf, and afterwards may be more able to fight againſt this potent Enemy: alſo, that a Quartan Feaver, during the Autumn and Winter, may paſs over with little trouble, this Bark is profitably adminiſtred: But thoſe, who expect a longer reſting time, from the aſſaults of this Feaver, are bid to take this powder in greater quantity, and more often, to wit, that they ſhould take two drams, three ſeveral times one after another, whether the Fits return or no; by this means, they remain longer free, yet they retain within, the Enemy ſtill, tho aſleep.

If it be demanded, concerning the Nature of this Bark, and the virtue in ſuppreſſing the fits of Intermitting Feavers, it is not to be diſſembled, that 'tis very difficult to explicate the cauſes of theſe kind of effects, and the manner of working; becauſe, there is not found as yet in any Subject, beſides, the like efficacy; but from a ſingular experiment, a general Reaſon is not to be rightly fitted: however, from the appearances diligently Collated, we will deduce ſome Theſes in order, which may make at leaſt ſome ſteps towards, if not obtain the verity of this thing.

It is to be noted therefore, in the firſt place, that this Medicine, being inwardly taken, eſpecially exerciſeth its force and energy on the maſs of Blood; becauſe, it does not at all irritate the Viſcera, neither cauſes in them any excretion, or trouble; beſides, whilſt it communicates its virtue to the Blood, it doth not at all put forth Antifeaveriſh property; wherefore, not always the next following fit, but the ſecond, or the third, is prevented, by the ſame being taken: and for this reaſon, that it may ſooner affect the Blood, it is a uſual thing, to drink the Liquor, very much impregnated with the ſame powder, for ſo its Particles are more eaſily conveyed into the maſs of Blood. Secondly, the virtue of this Bark, being impreſſed on the Blood, ſtays in it for ſome time, and that either ſhorter or longer, according as either a greater or leſſer portion of the Medicine was taken inwardly; for the Particles of this, being confuſed with the Blood, are a long while circulated with it, and by how much the longer they ſtay, by ſo much the more they affect its maſs, and produce a longer effect: for though Aliments, and ſome other things taken in, for that they are preſently overcome by the native heat, put off whatever they have of virtue, within ſome few hours, this being then aſſimilated or ſent forth adoors, they ceaſe to operate: yet ſome Medicines being taken inwardly, becauſe they are not eaſily tamed, nor caſt forth of doors preſently, by an irritation ſtirred up, they remain for many days very active, and hold a long time the Juices, and the Blood, in this or that manner of Fermentation, this may be obſerved of ſome Medicines, alſo of Poyſons, and Counterpoyſons, the once or twice taking of which, for ſome days, is wont to affect our Bodies

Bodies for a longer time; for 'tis an uſual thing with Cathartic Medicines, when they work little by Vomit, or Stool, to break forth after many weeks outwardly, in Puſtles and Wealks: yea, if Death be avoided, from the drinking of Poyſon, every body knows, that the virulency will lie hid, a long time in the Blood and Juices. In like manner alſo, this powder, and perhaps very many other things inwardly taken, altho they ſeem aſleep, yet continue to act, on the Spirits and Humors.

Thirdly, altho this Medicine acts immediately on the Blood and Humors, yet it takes not wholly away, the Feaveriſh Dyſcraſie, implanted in them: for, as ſoon as its force is conſumed, and all its Particles are flown away, from the mixture of the Blood, the Diſtemper being only ſuppreſſed for a time, at length riſes up, and repeats its fits after its wonted manner, but foraſmuch as Nature, by the ſpace of this ceſſation, becomes ſtronger, therefore, after the Relaps, the fits (not as before) but on the third or fourth day, according to the firſt figure of the Diſeaſe, are wont to return.

Fourthly, It is remarked, that this Remedy, does not ſtop the Feaveriſh acceſſions, as the ordinary Ague-reſiſters or Febrifuges, by fixing, or alſo by fuſing the Blood; for then the next fit always, and not the ſecond, or third following after, is prevented.

According to which poſitions, that we may inſtead of a Corollary, ſubjoin ſome things concerning the manner it ſelf of working, whereby this Medicine ſeems to act; we ſay, it is moſt likely, that when the Particles, proceeding from the ſame being taken, are throughly mixed with the Blood, they compel it into a certain new Fermentation, by which, whilſt the Particles of the Blood are continually agitated, they are wholly hindered, that they cannot heap up any Excrementitious matter, or enter into Feaveriſh turgeſcencies; for, as after the biting of a mad dog, or ſtinging of any venemous Creatures, the Blood it ſelf, and nervous Juice, are a long while impoyſoned, yet leſt they ſhould conceive preſently great irregularities, Counterpoyſons being taken, do hinder their Liquors, by retaining them in another Fermentation; the uſe of which, if ſo long continued, whilſt the virulent little Bodies are quite flown away, no horrid ſymptom is to be feared, from that evil being contracted; but if the ſtrength of the Remedy, being too ſparingly given, be firſt conſumed, forthwith the Venom repullulates, and the old Poyſon, thought to have been exploded, is at length brought into act: by the ſame way, when the Blood, having gotten a vitious diſpoſition, perverts the Alible Juice, and whereby it might more rightly expel it, heaped together to a fulneſs, conceives Feaveriſh ſwellings up; this Peruvian Bark being beaten, and adminiſtred, by the Commerce of its Particles, ſo agitates the Blood, tho diſtempered with an evil diſpoſition, with a new excited Fermentation, and alters it, that it in ſome meaſure concocts the nouriſhable Juice, and continually evaporates its Recrements, that they are not heaped together as before, into the matter of a fit: But, when the Particles of this Remedy, are wholly flown away, from the company of the Blood, and the whole virtue conſumed, the evil diſpoſition of the Blood, before contranCted, at length riſes up, and ſo the Feaveriſh fits return, after their wonted manner. Somtimes perhaps it happens, that whilſt the Feaveriſh fits are ſuppreſſed, by the uſe of this powder, by reaſon of the ſeaſon of the year being changed, or by the help of another Remedy, or by the endeavour of Nature it ſelf, that Dyſcraſie of the Blood may be mended, by degrees, and ſo the Feaver may at length vaniſh, of its own accord. This I have known to happen, but very rarely, becauſe almoſt with the ſame certainty, by which you expect the Feaveriſh fits to be ſuppreſſed, by that powder, you may afterwards look for their return.

As to what appertains to the ſenſible qualities, with which this Bark is noted, it appears to abound with bitterneſs, and a certain ſtipticity, that it ſeems to the taſt, to have the likeneſs of Savor, which is in moſt Conterpoyſons, as the Root of Gentian, Serpentary, Contrayerva, &c. for what are bitter in act, are ſtrong in excellent virtue, for the ſuppreſſing the force of preternatural Ferments; yea, the Root of Gentian, which is likeſt to this Bark, was in times paſt of famous uſe, for the Curing of Quartan Feavers. But now, altho this Peruvian powder, be the only Alexiterion or Counter-poyſon, as yet found out againſt a Quartan Feaver, to wit, that inhibits (tho only for a time) its fits, and of other Intermitting Feavers, yet it is not to be doubted; but that there are in the world, other Medicines extant, which are as good Ague-reſiſters; and it is hoped, that led by the example of this new invention, we may be excited, to the finding out the virtues of Herbs, almoſt as yet unknown: ſo,

which

whilſt we ſhall inſiſt on the trial of ſeveral, and the Empirical be joyned to the Rational Medicine, without doubt the Cures of the Quartan Ague, and of other invincible Diſeaſes, may more happily be accompliſhed: which therefore I promiſe more willingly to this Age, or at leaſt to the next, when being led by the Analogy of this Book, I have found out a Medicine, for the profligating of Feavers, of uſe not contemptible, it not being long ſince variouſly tryed, which alſo I am wont to give to the poorer ſort, inſtead of ſomthing elſe, with good ſucceſs.

CHAP. VII.

Of continual Feavers.

A Continual Feaver is that, whoſe fit is continued for many days, without intermiſſion: It hath its times of remiſſion, and of more fierceneſs, but never of intermiſſion; the burning is now more remiſs, now more intenſe, but ſtill the ſick are in a Feaver, until by the temperament, or inſenſible growing well, the Diſeaſe is wholly Cured. Concerning this, it behoves us to inquire, what Effervescency of the Blood it is, which cauſes a continual Feaver; then, by what ways, and from what cauſes, it is wont to be excited: alſo, how it differs from that, which is in Intermitting Feavers. And theſe being performed, we will deſcend to the Species of Continual Feavers.

There are many ways, by which the Blood growing hot, induces a continual Feavear, the chief of which may be reduced to theſe Heads: The firſt way is, when the more ſpirituous, and ſubtil Portion of the Blood, becomes too hot, and is diſtempered, with a certain burning, which therefore agitates the other parts of the Blood, and incites it into a certain rage, ſo that the Sulphur, or the Oily part of the Blood, is more diſſolved, and more inkindled in the Heart, alſo, for that cauſe, there is among all the Particles of the Blood, a certain ſyncriſis, contrariety, or perturbation, by which in truth, being confuſed, and put out of order, they are not able quickly to be extricated, and reduced into their former poſture, wherefore, a heat and burning more than is wont to be, is ſtirred up in the whole Body: but when the Spirits are only in fault, their heat and diſorder, are wont within a ſhort ſpace, to be allaied of their own accord, therefore, this Feaver is often terminated within a day, and is rarely continued beyond three: and therefore, is called an Ephemera, or a Feaver of a day, or Synochus of more dayr,

2. The ſecond manner, or degree of growing hot, is when the Sulphureous or Oily part of the Blood, being too much heated, conceives a Fervor: for then, it both grows immoderately hot in the Veſſels, and being very much inkindled in the Heart, produces by its deflagration, a very ſtrong heat in the whole Body. Indeed the Blood, as to its temper, moſtly depends on the condition of the Sulphur; when by reaſon of crudity, the Sulphur is leſs diſſolved, the Blood is made watery and cold, and is moved ſlowly in the Veſſels: but if the Sulphureous, or Oily part of the Blood, grows hot, beyond its Natural diſpoſition, preſently it becomes fierce, and improportionate with the reſt, ſo that, almoſt the whole being acted, as it were into a flame, by the Ferment of the Heart, compels the maſs of Blood to grow immoderately hot, and to boil up. For as when Wines, indued with a rich Lee, are ſtirred up into an heat, by the too rancid Sulphur; or as Hay, laid up too wet, by reaſon of the want of Ventilation, conceives of its own accord a burning, the Particles of the Sulphur being looſned from the mixture; in like manner, when the Blood is not rightly ventilated, but being reſtrained from Evacuation, by reaſon of the admixtion of ſome hot thing, or a more plentiful ſanguification, or for ſome other cauſe, the Particles of the Sulphur begin to be thickly gathered together; preſently, all its Liquor, immoderately boils up, by the Sulphurs being looſned, and inflamed in the Heart, and this kind of Feaver is induced, which is called a putrid Synochus; notwithſtanding which appellation, tho of many rejected, for that the Blood ſo long as it is in motion, doth not putrifie; yet foraſmuch, as in this Feaver, the mixture of the Blood, is ſomwhat

looſned, by the Sulphur being too much exalted, and the maſs of its Liquor being changed, from its Natural diſpoſition, tends toward putrefaction, therefore, the term of a putrid Feaver, as hath been anciently uſed, may be ſtill, with good reaſon, retained.

3. The third degree of growing hot, (and which conſtitutes a diſtinct kind of continual Feaver) is excited, from a certain malignant, and invenomed Ferment, by which, when the maſs of the Blood is imbued, and the Spirits, and the Sulphureous part together, conceive an heat, and their burning is not ſooner appeaſed, than that either that malignant matter be conſumed, and caſt forth of doors, or elſe a certain coagulation, and as it were putrefaction, of the Blood, from its corruptive venom is induced, by which, both circulation is hindered, and the Vital Spirit extinguiſhed. This malignity is wont to ariſe, either from a certain contagion received from without, or from ſome infection begotten within us; according to theſe ways the malignant Feaver, Small-pox, Meaſels, and alſo the Plague, draw their beginnings, and by their contagion, far and near ſet upon many.

There are therefore three degrees, or manners of growing hot, by which, the kinds of continual Feavers are determined. From the ſubtil portion of the Blood made hot, or the Ebullition of the Spirits, the Ephemera ariſes, as alſo the Synochus of one or more days: by the Sulphureous, or Oily part of the Blood, being too hot and inkindled, the putrid Feaver is ſtirred up, then thirdly, upon an invenomed taint, infecting the Blood, and congealing its Liquor, malignant Feavers depend. In every one of theſe, by the depravation, or rather corruption of the Alible Juice, freſh carried into the Blood, the various fits, inequalities, and critical motions ariſe. But before I enter upon the ſeveral kinds of a continued Feaver, it is requiſite for me, to conſider, how the growing hot of the Blood, in a continual Feaver, differs from that other, which conſtitutes Intermitting Feavers.

I ſay therefore, that the growing hot of the Blood, in an Intermitting Feaver, depends only, upon the commixtion of a certain Fermentative matter, and not rightly miſcible, with the Blood, and on its growing up, to a fulneſs of boiling over. Becauſe of this heat, with the Blood in the Veſſels, and of the deflagration in the Heart, the fit is induced; becauſe of its growing cool, the intermiſſion follows, that in the coming between of the fits, neither the Spirits, nor Sulphur, become outragious, but the bond of the mixture being kept whole, the Liquor is circulated in the Veſſels, equally, and without trouble: on the contrary, in a continual Feaver, the diſorders of the Spirits, and of Sulphur, of either, or both together, by their proper Ebullition, alſo without the mixture of any other, ſtir up the Ebullition of the Blood; wherefore, there are required, for an intermiſſion, beſides the diffiation or cooling of the Excrementitious matter, a deflagration of the inkindled Blood, and a reduction of it to its due Temper.

The Conſtitution of the Blood in a continual Feaver, is of the ſame ſort as of Wines, when they grow hot upon too rich a Lee; to wit, are mighty in Spirit, and grow turgid with exalted Sulphur, and therefore they conceive a Fervor, and greatly boil up, of their own accord, without the mixture of any other thing. In an Intermitting Feaver, the Blood is moved after that manner, as Wines, when they conceive an heat, becauſe of ſomthing poured to them, that is not miſcible with them: Moreover, in this Feaver, the diſpoſition of the Blood is of that ſort, as of Wines, when in their decay and declination, they become ropy, unſavory, or acid, to wit, in which the Spirit is depreſſed, that in the mean time, either Salt, or Sulphur, or both together, appear above the reſt, and infect the whole Liquor with their diſorder. An Intermitting Feaver, for the moſt part, is free from danger, becauſe the conſtitutive parts of the Blood, altho they ſhould ſomwhat change their diſpoſition, however, keep the bond of mixture, and whilſt they are in power, are circulated equally in the Veſſels, yea they pervert the nutritious Juice, into a matter, not altogether beſides Nature, but rather infeſting, with its fulneſs and turgeſcency. In a continual Feaver, beſides the intemperance, the mixture of the Blood, and conſtitution of the Liquor, are ſomwhat looſned, and its corruption eaſily follows; wherefore this Diſeaſe often ends in death: further, the nouriſhing Juice is depraved, into a matter wholly vitious, and altogether infeſtous to Nature.

CHAP. VIII.

Of the Ephemera or Feaver for a Day.

I Have ſaid, the leaſt degree of heat, which induces a continual Feaver, is placed in the ſubtil, and Spirituous part of the Blood, being too much agitated and heated; for this, like the Spirit of Wine, boils up on every light occaſion, and conceives a fervor, by a too great motion of the Body, or perturbation of mind, by the ambient heat as of the Sun or vapours, by hot things taken inwardly, as the drinking of Wine, and the eating of peppered meats, and being irritated by ſuch like. For the Spirits of the Blood, eaſily take fire, and being impetuouſly moved, are not preſently appeaſed, but they move throughly other Particles of the Blood, variouſly confound, and ſnatch them, into a rapid and diſorderly motion; alſo from this motion of the Spirits, the Sulphur, or Oily part of the Blood, is more boiled forth, ſomwhat more diſſolved, and ſomthing more fully inkindled in the Heart, by which means, an intenſe heat is raiſed up, in the whole Body. But foraſmuch, as Sulphur is inkindled, and inflamed only by ſmall parts, and not in the whole, that fervor of the Spirits is quickly appeaſed, and ceaſes: wherefore, the Feaver which is excited by this means, for the moſt part is terminated, within twenty four hours, and therefore is called an Ephemera, or a Feaver of a day. If that by reaſon of a greater heat of the Spirituous Blood, it is prolonged further, it rarely exceeds three days, and is called an Ephemera of more days, or a Synochus not putrid: but if it ſhould happen to be lengthned beyond this time, this Feaver eaſily paſſes into a putrid, *viz.* from the dayly Ebullition of the Spirituous Blood, the more thick Particles of the Sulphur, at length begin to take fire, and involve the whole maſs of Blood, in its Effervеſcency: even as the Spirit of Turpentine, being ſhut up in a Cucurbit, and being put into a Sand Furnace, if it be forced with a moderate heat, boils up gently, as the Blood in a Feaver of a day; but if the heat be made more ſtrong; the Liquor grows impetuouſly hot, till it breaks forth into a flame, to which the inflamation of the Blood, in a putrid Feaver, may be very aptly compared.

The Days Feaver, and Synochus ſimple, rarely begin without an evident cauſe: Beſides what hath been but now ſaid, immoderate Labour, Watchings, a ſudden paſſion of the mind, a conſtriction of the pores, a Surfeit, alſo a Bubo or inflamed Sore, a Wound, the coming down of the Milk in Child-bearing Women, are wont to induce them: The procatartic Cauſes, which diſpoſe to this, are an hot temper of Body, an active habit, a ſedentary life, and diſuſe of exerciſe.

The chief beginnings of this Diſeaſe, depend upon the preſence of the evident cauſe: for either, little Bodies of extraneous heat, being confuſed with the Blood, like water boiling over the fire, make it to boil up; or this Feaver is induced, by motion, or by reaſon of tranſpiration being ſtopped; even as Wines made hot by motion, or when too cloſely ſtopped in the Ton, are put into a Fervor: but what way ſoever an inflamation is firſt excited, preſently the Spirits become enraged, and being moved hither and thither, compel the Blood to boil up, and to be inlarged into a greater ſpace, with a ſpumous rarefaction: wherefore, the Veſſels are diſtended, and the membranous parts hauled, hence follow pain, chiefly in the Head and Loins, a ſpontaneous wearineſs, and as it were an inflation of the whole Body. If that, with the Spirit of the Blood, a certain Sulphureous part, be alſo in ſome meaſure inkindled, a ſharp heat is diffuſed through the whole, the Pulſe is vehement and quick, the Urine red, alſo thirſt, watchings, and many other ſymptoms infeſt, the reaſons of which are added hereafter.

Concerning the Solution, or Criſis of the Ephemeran Feaver, and of the not putrid Synochus, three things are chiefly requiſite: *viz.* a removing of the evident cauſe, ſecondly a ſeparation, and a ſcattering of the depraved, or excrementitious matter, from the maſs of Blood: Thirdly, a quieting of the parts of the Blood, and a reſtitution of them, to their natural and equal motion and ſite. According as theſe ſucceed, now more ſuddenly, now more ſlowly, and difficully, this Diſeaſe is finiſhed in a ſhorter, or longer time.

1. The evident cauſe, which for the moſt part is extrinſick, is eaſily removed, and the ſick are wont, preſently to avoid the preſence, or aſſiduity of that thing, and do perceive a ſenſe of any thing that is hurtful; none taking a Feaver from Wine, will ſtill indulge the drinking of it, as ſoon as any one grows more than uſually hot, in a Bath, or the heat of the Sun, 'tis a trouble to them to ſtay longer.

2. As to the Excrementitious matter, which ought to be ſcattered, and ſeparated from the Blood: this is either brought from without, as when the Blood is infected by ſurfeit, drinking of Wine, ſitting in the Sun, or from a too hot Bath, with *Effluvia*, or little dry, and Fermentative Bodies; or this matter is begotten within, as when its Liquor is ſtuffed with recrements, or aduſt Particles, from the deflagration of the Blood. Either of theſe matters, ought to be ſeparated from the Blood, to be diſperſed, and either by ſweat, or inſenſible breathing forth, to be thruſt out of doors, before the Feaver be appeaſed; wherefore, when as the pores are bound up, and tranſpiration hindred, the Ephemeran Feaver is longer protracted, and ſomtimes paſſes, from a ſimple Synochus, into a putrid.

3. The evident cauſe being removed, and this degenerate matter diſperſed, there is required for the remiſſion, a quieting, and reducing into order, the parts of the Blood; for diverſe Particles of the Blood, being after this manner confuſed; and by reaſon of the Feaveriſh heat, carried up and down, they do not preſently get again the former order of ſituation and poſition; but it is needful, that they be by degrees extricated, and by little and little reſtored, to a juſt mixture.

Although this Diſeaſe, after the removing of the evident cauſe, for the moſt part ceaſes of its own accord, within a while, yet ſome Medicinal Remedies may be adminiſtred, with good ſucceſs, eſpecially, when there is danger, leſt the Ephemeran Feaver, ſhould paſs into a putrid, The chief intentions ſhould be, to ſuppreſs the fervor of the Blood, and to procure a more free tranſpiration; to the which conduce, firſt a breathing of a Vein, a ſlender diet, or rather abſtinency, cooling drinks, and a bringing away the filth of the Belly, by Clyſters: Sleep, and Reſt, greatly help, above all the reſt; which, if wanting ſhould be procured in time, by Opiats, and Anodynes.

Verily, altho the Hiſtories, and Obſervations of thoſe, diſtempered with an Ephemeran Feaver, contain in themſelves nothing very rare; yet I ſhall ſubjoin an example or two, in this place, whereby the delineation or type of this Diſeaſe, may be illuſtrated.

A certain young Gentleman, about twenty years of Age, endued with a ſtrong habit of Body, by the immoderate drinking of ſtrong Wine, fell into a Feaveriſh diſtemper, with thirſt, heat, and with a great burning of his Precordia; being let Blood, he drank a great quantity of fair water, and upon it preſently a plentiful ſweat following, he grew ſhortly well: In this caſe, the more thin portion of the Blood, being heated by the Spirits of the Wine, fell into a rage, cauſed the whole maſs of Blood to be ſhaken, and its frame to be looſned, more than twas wont; and for that reaſon, that hapned to be more diſſolved, by the Ferment of the Heart, and to be as it were inkindled by the active Particles, looſned from the mixture; until the Veſſels being emptied by Phlebotomy, the raging Blood was cooled, and by the drinking of the water, its fervor was attempered; then the hot *Effluvia*, being involved, together with the aduſt matter, with a copious *Serum*, and ſent away by Sweat, the Blood at length recovered its due temper. Moreover, an ingenious young man, of a ſedentary life, and alſo very much addicted to the Study of Learning, when he had for ſomtime exerciſed himſelf, beyond his ſtrength, in the hot Sunſhine, he began to complain of the pain of his head, a want of Appetite, a heat of his Precordia, and of a Feaveriſh diſtemper all over; to whom, (for that he was wholly averſe to Phyſick) I ordered an abſtinence from all things whatſoever, unleſs from Small-Beer, and Grewel; on the ſecond day, and ſo more on the third, the ſymptoms remitted, by little and little, on the fourth, he went home freed from the Feaver, without any Medicine.

Chap. IX.

Of a Putrid Feaver.

So much for a Continual Feaver, which is raiſed from the moſt ſimple heating of the Blood, or its loweſt degree of inordinate heat; that which depends on a greater degree of heat follows, *viz.* when the Oily or Sulphureous part of the Blood, being too much heated, ſwells up above meaſure, and as it were forced into a flame; and therefore from the ſimilitude, by which humid things putrifying, conceive an heat, this kind of Ebullition of the Blood, becauſe it induces an immoderate heat, is called a putrid Feaver: which name ought to be retained without injury, becauſe that in this Feaver, the Syntheſis of the Blood, (as is wont to happen in putrifying Liquors) is very much unlocked. When the Spirits only grow inraged, (as in an Ephemera) the frame of the Blood is ſomwhat ſet open, and looſened, that it is more diſſolved, by the Ferment of the Heart, than is wont, and more Particles than naturally uſe to do, leap forth, and diffuſe a more intenſe heat; but yet the mixture of the Liquor, as to its chief parts, is conſerved. But when the Sulphureous matter taking fire, grows hot above meaſure, the bond of the mixture, for the greateſt part, is looſed, that its Principles are almoſt wholly drawn away, by the Ferment of the Heart, and the active Particles, being looſned from the mixture, break forth as it were into a flame. Wherefore, the Liquor of the Blood being after this manner rarified, in the Heart, and as it were inkindled, is from thence carried, through the Veſſels, with a moſt rapid motion, and diſperſes very many *Effluvia* of heat, from its deflagration. Hence, the whole maſs of Blood, (like water put over the fire) continually boiling, diſtends the Veſſels, pulls the Brain and Nervous parts, raiſes up Convulſions, and pains in them, very much deſtroys the Vital Spirits with its heat, waſts the Ferments of the Bowels, hinders the Offices of concoction, and diſpenſation, often depraves the nouriſhing Juice, deſtinated for the Nervous ſtock, that from thence exceeding great diſorders of the Animal Spirits follow; yea almoſt perverts the whole œconomy of Nature.

The courſe of this Diſeaſe ſhews it ſelf after this manner; It rarely begins without a procatartic cauſe, or previous diſpoſition: to wit, the Sulphureous or oily part of the Blood, is firſt too much carried forth, and exalted beyond its due tenor, which afterwards, either of its own accord, (like Hay not eventilated) begins to grow hot, or by the coming of an evident cauſe, it is forced into a preternatural heat. But when it grows turgid in the firſt place, by reaſon of the admixtion of a crude Juice with the Blood, now a ſhivering, now heat infeſts, which ſhew themſelves unequally, like fire, which is covered with green wood, ſends forth now ſmoak, now flame: But at length, the fire glowing more largely, as here the victor fire ſpreads it ſelf abroad, ſo there (ſooner than ſaid) the whole maſs of Blood is inflamed, and is urged at once with heat, and a moſt ſwift motion: Nor is this immoderate heat of the Blood appeaſed, before its active particles being looſned from the mixture, and then ſucceſſively inkindled in the Heart, are wholly burned out, which doth not happen, but in the ſpace of many days. And then at length this Feaver ceaſes, when the remaining Liquor of the Blood, the Spirit and Sulphur being very much conſumed, being made lifeleſs and poor, is fit only for a weak and ſmall fermentation. From this kind of deflagration of the Blood, and alſo of the alible Juice, (by the ſame fire burnt out) the recrements, or little Bodies of torrified matter, are heaped up in the Blood; which yet do more promote its fervor, and ebullition, and for a time, increaſe the Feaveriſh diſtemper. After the Blood hath very much burned forth, and theſe kind of little Bodies, are gathered together to a fulneſs of ſwelling up, the vital Spirit endeavors a ſeparation, and tries to concoct, and to overcome, (what it may) theſe aduſt recrements, and then, having put a great many of them into a ſwelling up, a Flux being riſen, ſtrives to ſhut them wholly out. And indeed, in the ſubaction, and ſecluſion of this matter, chiefly conſiſts the event of this Diſeaſe; for if the vital Spirit being ſtrong, the Bloody humor (when it hath ſufficiently burned forth, and ſhall be freed from

theſe aduſt particles) ſhould recover its priſtine tenor, whereby it is made fit for motion, and a due fermentation in the Heart, the ſick tends towards health; but if, by a long deflagration, and an inextricable confuſion of the morbific matter, the liquor of the Blood, being wanting of Spirits, and more pure Sulphur, or thoſe ſame (by the impure mixture growing ill) being as it were put under the yoak; is rendred ſo lifeleſs, that it is not any longer rarified, by the ferment of the Heart, or inkindled; by degrees, its heat, and motion, together with Life it ſelf decays.

The procatartick cauſes, which diſpoſe to this Diſeaſe, are, an hot and humid Temper, an active habit of Body, a youthful Age, the Spring time, or Summer ſeaſon, a high and rich Dyet, beſides the often drinking of rich Wines, a ſedentary and idle life, a Body full of groſs humors, and ſtuffed with vitious Juices; but above all the reſt, it appears by obſervation, that the frequent letting of Blood, renders men more apt to Feavers; wherefore it is commonly ſaid, from whom Blood is once drawn, that unleſs they do the ſame every year, they are prone to a Feaver. The reaſon of this is, (unleſs I am deceiv'd) by the frequent letting of Blood, the Sulphur is more copiouſly gathered together, in the maſs of Blood; in the mean time, the Salt (which ſhould bridle it, and hinder it from raging) by this means is drawn away; for the Blood, the older it grows, becomes ſo much the more Salt, the Salt of all the Elements not evaporating. But by how much the more the Blood abounds in Salt, by ſo much the leſs it abounds in Sulphur; for Salt eats and conſumes the Sulphur, and makes it evaporate: wherefore, they who are lean, and abound with a Salt Blood, are leſs prone to Feavers. But when, by the letting of Blood, the ancient Blood is drawn forth, in its ſtead another more rich, and more impregnated with Sulphur, is ſubſtituted; ſo that it becomes leſs Salt, and more Sulphurous. Hence it is, that thoſe who often let Blood, are not only prone to Feavers, but alſo are wont to grow fat, becauſe of the Bloods being more impregnated with Sulphureous Juice.

The evident cauſes, which deduce the latent diſpoſition of this Feaver into act, are of the ſame ſort, which procure an Ephemeran Feaver, and ſimple Synochus; in this rank chiefly come, Tranſpiration being hindred, and Surfeiting. By reaſon of the *effluvia* being reſtrained, the maſs of the Blood being increaſed in bulk grows turgid, and conceives a Fervor, as it were from a certain ferment, inſpired anew, and cruelly boyls up; from thence, preſently the pores are more obſtructed, by the infartion of the *effluvia*, and the frame of the Liquor being looſned, the particles of the Sulphur, exuberating in the Blood, leap forth from the mixture, and are inflamed by the ferment of the heart, as it were by fire put to them, and ſo they enkindle a very intenſe Feaver. But from a Surfeit, both an immoderate fermentation is induced in the Blood, and alſo a nitrous Sulphureous matter, apt for aduſtion, and an inkindling is conveyed, as it were food, to the burning Blood.

In this Feaver, four times or ſeaſons are to be obſerved, in which, as it were ſo many poſts, or ſpaces, its courſe is performed: Theſe are then, The Beginning, the Augmentation, the Height, and Declination. Theſe are wont to be finiſhed in ſome ſooner, in others more ſlowly, or in a longer time. The beginning ought to be computed, from the time the Blood begins to be made hot, and its Sulphur to conceive a burning, untill the ardors, and burnings are diffuſed, thorow the whole maſs of Blood. The Increaſe or Augmentation, is from the time, that the Blood being made hot, and inkindled thorow the whole, burns forth for ſome time, and its maſs is aggravated with the Recrements, or burnt Particles, which increaſe the fermentation. The ſtate, or ſtanding of the Diſeaſe, is when (after the Blood has ſufficiently burned forth, and its burning now remits) the long vexed Blood, like a noble wreſtler, when his adverſary is a little yielding, recollecting all his ſtrength, endeavours a bringing under, and a ſeparation of that aduſt matter, with which it is filled to a plenitude, and alſo, a Criſis or ſeparation being once or oftner attempted, an expulſion of it forth of doors. The Declination ſucceeds after the Criſis or ſecretion, in which the Blood grows leſs hot, with a languiſhing fire, and either, (the vital Spirit being as yet ſtrong) overcomes what is left of that aduſt and extraneous matter, and by degrees puts it forth, until it is reſtored to its former vigour; or, whilſt the ſame Spirit is too much depreſſed, the liquor of the Blood, is ſtill ſtuffed with aduſt recrements, and therefore becomes troubled and depauperated, that it neither aſſimilates the nouriſhing Juice, nor is made fit for an accenſion in the heart, for the ſuſtaining the lamp of Life.

1. When therefore any one is taken with a putrid Feaver, the firſt aſſault is for the moſt part accompanied with a ſhivering or horror: for when the Blood begins to grow

grow hot, there is a flux made, and a ſwelling up of the crude Juice, freſhly gathered together in the Veſſels, even as in the fit of an intermitting Feaver, heat, and ſomtimes ſweat follow, upon the ſhivering, by which, the matter of that crude Juice is inkindled, and diſperſed: afterwards, a certain remiſſion of the heat follows, but yet from the fire ſtill glowing in the Blood, a laſſitude, and perturbation with thirſt, and waking, continually infeſt: A pain ariſes in the Head, or Loins, partly from the ebullition of the Blood, and partly from the motion of the nervous Juice being hindred; alſo a nauſeouſneſs, or a vomiting offends the Stomach, becauſe the Bile, flowing out of the Choleduct Veſſels, is poured into it, and a Convulſion from Vapors, and from the ſharp Juice brought thorow the Arteries, is excited in the Stomach. In the mean time, altho the heat be more increaſed, and inequal, it is not yet ſtrong, becauſe the Blood as yet abounding with crude Juices, is only inkindled by parts: and therefore burns out a little, and then ceaſes, and at laſt returns; like a flame that is made by wet, and moiſt ſtraw. In this condition for ſome days, the Diſeaſe remains, the Urine is more red than uſual, by reaſon of the Salt, and Sulphur being more diſſolved, and infected with the *ſerum*; It ſtill retains its Hypoſtaſis or ſubſtance, becauſe the Coction and aſſimilation are not altogether depraved; it appears greater than ordinary, in its ſediment, which is yet eaſily ſeparated, and falls to the bottom of its own accord. At this time, they may let Blood, and adminiſter Phyſick by Vomit, or Purge, ſo it be done without any great perturbation of the Blood: it often happens, from theſe kinds of evacuations, timely performed, that a greater increaſe of the Diſeaſe is prevented, and the Feaver as it were killed in the ſhell. The limits of this ſtadium or ſpace, are variouſly determined, according to the temper of the ſick, and other accidents of the Diſeaſe; ſomtimes, the firſt rudiments of this Feaver, are laid in a day or two; ſomtimes the beginning of the Diſeaſe is extended to more; if in a corpulent Body full of Spirit, Juice, and hot Blood, or it happen in a youthful Age, and very hot ſeaſon, if the diſpoſition to a Feaver be potent, and the evident cauſe coming thereupon be ſtrong, the Feaveriſh heat, being once begun, quickly invades all the Blood, and on the ſecond or third day, having rooted it ſelf, the Diſeaſe ariſes to its increaſe; but if the Feaveriſh indiſpoſition, be begun in a leſs hot Body, a Phlegmatic temper, or a melancholy, and in old age, or a cold ſeaſon, the entrance is longer, and ſcarce exceeds the limits of this firſt ſtadium or ſpace, before the ſixth, or ſeventh day.

2. The increaſe of this Diſeaſe, is computed from what time, the burning of the Feaver hath poſſeſt the whole maſs of Blood: that is, the Sulphur, or the oily part of the Blood, having been long heated, and growing fervent in parts, at length, like Hay laid up wet, breaks forth, after a long heating, all at once into a flame; the Blood at this time cruelly boils up, and very much inkindled in the Heart, by its deflagration, diffuſes as it were a fiery heat thorow the whole Body, and eſpecially in the precordia; hence the ſick complain of intolerable thirſt, beſides a pain of the head, pertinacious wakings, and oftentimes a delirium, Phrenſie, and Convulſive motions infeſt: all food whatſoever is loathſom, either it is caſt up again by Vomit, or if retained, being baked by too much heat, it goes into a Feaveriſh matter; beſides, there happens a bitterneſs of the mouth, an ingrateful ſavor, a ſcurfineſs of the Tongue, a vehement and quick Pulſe, an Urine highly red, and for the moſt part troubled, full of Contents, without Hypoſtaſis or laudable ſediment; when the Blood is at this time almoſt wholly inkindled by its deflagration, it begets great plenty of aduſt matter, (as it were aſhes remaining after a Fire) with which the *ſerum* being very much ſtuffed, renders the Urine thick, and big with Contents: Alſo the Blood, being filled with a load of this, to a riſing up, is irritated into Critical motions, by which this Feaveriſh matter, (if it may be done) being brought under, and ſeparated, is ſhut out of doors; and indeed, this ſtate of the Feaver induces that, in which a Judgment is diſcerned, between Nature and the Diſeaſe, the ſtrife being as it were brought to an æquilibrium; and therefore the evacuation, which follows from thence, is called the Criſis.

The ſtate therefore, or height of a putrid Feaver, is that time of the Diſeaſe, in which Nature endeavors a Criſis, or an expulſion of the aduſt matter, remaining after the deflagration of the Blood. To this is required, in the firſt place, that the Blood hath now for the moſt part burned forth; becauſe in the midſt of its burning, Nature is not at leiſure for a Criſis, nor is it ever proſperouſly endeavored, nor in truth procured by Art with good Succeſs. Secondly, that the ſpirit of the Blood, doth firſt, by ſome means ſubdue this aduſt matter, or *Caput mortuum*, ſeparate it from the profitable, and render a period to the expulſion, for otherways, tho a copious evacuation happens,

Nature

Nature will never be free from her burthen. Thirdly, that this matter, be gathered together in such a quantity, that by its turgency, it may irritate Nature to a Critical expulsion. If these rightly concur, a perfect Crisis of the Disease, for the most part succeeds, in which, even as in the Fits of intermitting Feavers, a Flux being arisen, whatsoever extraneous and heterogeneous thing, is contained in the bosom of the Blood, is exagitated, then being separated, and involved with *serum*, it is thrust forth of doors; when any thing of these is wanting, the Crisis, for the most part, is in vain, and not to be trusted, and rarely cures the Disease. For if in the midst of the burning, before the Blood hath sufficiently burned forth, an evacuation happens, by Sweat, a Lask, Bleeding, or any other way, the adust matter is not all separated, or else, if for the present, it be drawn away for the greatest part, the Blood more largely flaming out, presently substitutes new, and will renew the Feaver again, that seemed to be vanquished: If that this matter, not being yet overcome, nor brought to a fulness of rising up, be irritated to an expulsion by Nature, an imperfect, and partial Crisis only follows; and when the first indeavor of excretion shall be in vain, rarely a perfect, and curatory succeeds after that one time.

The Crisis in a continual Feaver, is almost the same thing, as the Fit of the intermitting Feavers. For as in this, when the mass of Blood, is filled to a fulness of swelling up, with the particles of depraved alible Juice, and fitted for maturation, there are made a Flux, secretion, and expulsion out of doors of that matter: so in a continual Feaver, from the deflagration of the Blood, and alible Juice, very many little Bodies of adust matter are gathered together, with which, when the Blood is aggravated, and is at leasure, a little from the burning, it overcomes them, by little and little separates them, and then a Flux being raised up, endeavors to cast them out of doors: wherefore, as the Fits of intermitting Feavers come not but at a set time, and after so many hours, so also the Critical motions, happen from the fourth day to the fourth, or perhaps from the seventh day to the seventh, for in this kind of space, the Blood being inkindled burns forth, and with its burning makes an heap of adust matter, as it were ashes, which being troublesom to Nature by their irritation, induces Critical motions.

Therefore, what some affirm is not true, That the Crises depend altogether on the influences of the Moon, and Stars, and follow their Aspects, Quadrations, Oppositions, or Conjunctions: becaus the Critical evacuations are only determined, by the gathering together, and the swelling up, of the adust matter. For, as soon as the Blood is at leasure, from the deflagration, and being filled with the particle of that adust matter, is able in some measure to overcome, and separate them, presently a Flux, or swelling up being risen, it endeavors to thrust them forth by any way; which, for that they are easily to be separated from the Blood, and the breathing places of the skin are sufficiently open, being involved with *serum*, are sent away with sweat. And this is the best way of the Crisis, which if it rightly succeeds, very often, wholly, and at one time, perfectly cures the Disease without danger of relapse: To this next, follows the Crisis, which which is endeavored by the Hemorrhage or bleeding at nose; for this matter, as it were the flowring, being moved with the Blood, (if it be not cast forth by sweat, by reason of a less free transpiration) is transferred from the heart, into some remote part, and frequently is cast into the head, by the impetuons rapture of the Blood; where, if a passage be open, from the private holes opening into the nostrils, the morbific matter, leaps forth of doors, with a portion of the Blood. But otherways being oftentimes fixed in the Brain, brings a phrensie, delirium, or other grievous, and tedious Diseases of the head; yea, tis to be observed, that almost in all continual Feavers whatsoever, when they are hardly or imperfectly cured, so that the Blood is infected, for a long time with the Feaverish matter or adust recrements, that from thence, the nervous Juice (as it seems) contracting an infection, pertinacious distempers, to wit, watchings, also Deliriums, Tremblings, Convulsive motions, and long adhering weakness of the nervous parts follow. Also, there are other ways of Crisis, by which Nature endeavors, not at once and wholly, but by little and little, and by parts, to expel the Feaverish matter; now by Urine, now by Vomit, or Stool, now by breakings forth, and buboes, or biles; by what way soever, that it may be done with a good event, it is required, that the deflagration of the Blood be past, and that the adust matter be concocted, and rendered fit to be separated.

The ſtate or ſtanding of the Diſeaſe, is therefore not one, and ſimple, nor always happens after the ſame manner, but with a various difference of ſymptoms, and tending to far different events. But by a prudent Phyſician, a Prognoſtication is expedient to be given, in what ſpace of time, the Diſeaſe will come to its height or ſtanding, and what end it will have.

If the Feaver be vehement from the beginning, and ſuddenly invades the whole maſs of Blood with a burning; if it urges conſtantly, and equally without any remiſſion, with a ferocity of ſymptoms; for the moſt part, the Blood will ſo much burn forth, in the ſpace of four days, that the aduſt matter, will ariſe to a fulneſs of ſwelling up, for the making a Criſis. But if its beginnings are more ſlow, and the accenſion of the Blood often interrupted, the Feaver will come to its *acme* or height, about the ſeventh day. If it ſhould begin yet more remiſs, the ſtanding of the Diſeaſe is wont to be drawn out, to the Eleventh or Fourteenth day. In the mean time it is to be noted, that as the Fits of intermitting Feavers return at ſet times, ſo the Critical motions in continual Feavers, (but for the moſt part they obſerve the fourth day:) for altho the Criſis may be perfectly prorogued to the fourteenth, ſeventeenth, or perhaps the twentieth day, becauſe all things, requiſite to the full curing of the Diſeaſe, do not ſooner concur; yet in the time betwixt, more light motions happen, by which the Feaveriſh matter ariſing leiſurely, to an increaſe, is a little emptied, and as it were cut off by parts, until Nature may be able to enter upon its more full diſcuſſion; but when the great proviſion of the aduſt matter, in the burning Blood, is heaped up in the Veſſels, Nature, unleſs otherways diſturbed, on every fourth day, being tyred with the plenty of matter, trys to ſhake off part of its burthen by a certain ſwelling up: wherefore, for the moſt part, the Critical motions happen on the fourth, ſeventh, eleventh, and fourteenth days, not by the direction of the Planets, but by reaſon of the neceſſity of Nature.

As to the event, whether the Criſis ſhall be good or not, certain foreknowledges are taken, from the ſtrength of the ſick, the Pulſe, Urine, and other ſigns, and concourſe of ſymptoms: If the ſick appear with ſome ſtrength, the fire of the Feaver urging, hath a ſtrong and equal Pulſe, if the Urine be of a moderate conſiſtency with ſome ſediment, with a ſeparation of the Contents, and eaſily falling to the bottom, if the Diſeaſe ſhall make its progreſs, without great Vomiting, Watchings, Phrenſie, Convulſive motions, and ſuſpition of malignity, the ſtanding will be laudable, and to be expected with a good Criſis: if the contrary to theſe happen, *viz.* that preſently ſtrength is caſt down, and that the ſick is obnoxious to frequent Swoonings, Convulſions, a delirium, with a weak intermitting or unequal Pulſe, if pertinacious watchings, intollerable thirſt, and Vomiting continually infeſt; if the Urine be thick and troubled, without ſediment, or ſinking down of the parts, if, the burning yet troubling, Nature is provoked to critical evacuations, a very dangerous ſtate of the Diſeaſe is imminent, nor may there be hoped for any thing of good from the Criſis.

Concerning the Criſis of a Putrid Feaver, we will here ſubjoyn a particular Prognoſtication, in which, though the things, which from the beginning did appear, might promiſe a moſt deſired event, a very deadly one is imminent; I have often obſerved, in a Putrid Feaver, which begins ſlowly, and with a ſmall burning, if the Urine be red, and when rendred preſently troubled, and thick, which is not precipitated, neither by the cold, nor of its own accord, puts down a ſediment, and if at the ſame time, the ſick lie for many days without ſleep, tho quiet, and that they toſs not themſelves up and down, their condition is in danger: and the ſuſpition will be more, if in the mean time, they are neither troubled with a ſtrong Feaver, nor infeſted with thirſt, or with a very troubleſom heat; becauſe thoſe diſtempered after this manner, are incident for the moſt part, about the ſtate of the Diſeaſe, to a delirium, Convulſive motions, and oftentimes fall into madneſs, from which they are quickly caſt into death; and when theſe ſymptoms ariſe, the Urine is altered, from a thick and red, into a thin and more pale Urine. It ſeems in this caſe, the maſs of Blood, being taken with the Feaver, not to grow turgid, ſo with Sulphur exalted to the height, as Wines or Beer are wont in their Effervеſcencies; but (the Salt, and the terreſtrial Lee or Dregs, being ſtirred together with the Sulphur) to be affected after the ſame way, as Wines and Beer, being ſuddenly diſturbed with Thunder, and growing ſour; wherefore, altho the Blood does not preſently conceive an immoderate heat from the Feaver, yet its diſpoſition being changed, it wholly depraves the Juice deſtinated to the Brain, and Nervous parts, and therefore, about the beginning of the Feaver, pertinacious watch-

ings happen, then the ſtate growing urgent, the œconomy of the whole Nervous ſtock is perverted. Melancholic perſons are moſt obnoxious to theſe ſort of Feavers, in whom the unrulineſs of the Sulphur, are a little reſtrained, by the Salt, and Earthy dregs being ſtirred up with it, notwithſtanding which, all being leiſurely carried forth, break forth afterwards, with a greater ſlaughter.

When the Diſeaſe ſhall come to the ſtanding, either the buſineſs is done at one conflict, and from thence with a manifeſt declination, there is made a tranſlation to life, or death, or there are made frequent skirmiſhes, between Nature and the Diſeaſe, and critical motions are often attempted, before the victory is yielded to either party.

1. As to the firſt, If after the Blood hath ſufficiently burned forth, with a good precurſion of ſigns and ſymptoms, and its burning hath remitted, the aduſt matter being equally brought under, and ſubtilated, ariſes from a full increaſe, to the motion of boiling up; and Nature being free from any impediment or depreſſion, is ſtrong with able ſtrength enough, for the decertation or ſtrife, the Feaveriſh matter, for the moſt part, is exterminated at one motion of its flowring or putting forth, and the Blood being freed from its fellowſhip and infection, ſoon recovers its former vigour.

2. But if Nature is ſtirred up, to a critical motion, before the Blood hath perfectly burnt forth, or that aduſt matter is prepared for excretion, altho, as to the reſt, things are in a moderate condition; yet from hence, but an imperfect Criſis follows, by which indeed, ſomthing of the load or burthen, with which the Blood is oppreſſed, is drawn away; notwithſtanding preſently another ſprings up afreſh, in its place, and then at ſet times, (perhaps in four, or ſeven days ſpace) like the fits of intermitting Feavers, the critical motions are repeated, the ſecond, and perhaps the third time, before the ſtrife being ended, the matter openly inclines to this, or that party.

3. But when, with the preceeding evil appearance, of ſigns and ſymptoms, the burning of the Blood yet urging, the critical motion is provoked, without any coction of the Feaveriſh matter, ſomtimes Nature is overthrown at the firſt conflict, nor doth ſhe recollect herſelf, but yielding her powers overcome by the Diſeaſe, is precipitated into death. Nor is the buſineſs much better, when the Criſis is at firſt imperfect, and in vain, celebrated, without any eaſe to the ſick, and from thence, the next to this ſucceeds worſe, and then in another, and perhaps another conflict, the Diſeaſe prevails, until the ſtrength being wholly broken, and caſt down, there is a plain end of life.

Thus much concerning the ſtate and Criſis of the Diſeaſe, on whoſe good or improſperous ſucceſs, the event of the Diſeaſe depends; the declination of the Feaver, takes its period of this, of which we muſt ſpeak next.

4 Altho the Declining of the Feaver, for the moſt part, is taken in the better part, that it denotes the condition of the ſick growing well of the Diſeaſe, in which the Blood being almoſt freed from its Effervency, recovers leiſurly, ſtrength and ſpirits, that were loſt, and expels what extraneous thing is left remaining in its boſom; yet, in a genuine enough ſignification, it may be uſed for that ſtate, when from an ill Criſis, or in vain, the Blood being depauperated, and infected with an extraneous and Feaveriſh mixture, ſtill declines for the worſe, until at length (like Wine changed into a lifeleſſneſs) being made wholly unable for circulation, and accenſion in the Heart, it calls on death. Therefore, in this place, the name of declination ſignifies the condition of the ſick, and of the Diſeaſe, which follows the ſtanding, whether it tends to life, or to death; whether the Feaver, or life it ſelf of the ſick, at this time, declines.

As to the times of declination, it will be worth our labour to inquire, what the temper of the Blood may be, and what turns of alterations it has undergone, as often as from a good, or bad Criſis, there has been made a progreſs of the Diſeaſe, towards Health, or Death. To wit, firſt, what the diſpoſition, or condition of the Blood and Spirits may be, from a good Criſis, and with what alterations, its ſpoiled Liquor recovers its former vigor. Secondly, what their temper is, from an evil Criſis, and by what degrees it ſtill tends to worſe; and laſtly, how they are, when from a doubtful ſtate, and long weakneſs, the ſick hardly get up at length, and recover their health.

The vice, or depauperation, which the Blood hath contracted from the Feaveriſh heat, conſiſts in this: The Spirit very much evaporates, and is loſt: the Sulphureous part is too much ſcorched, and is much waſted by the deflagration, and from its burning, the aduſt matter (as it were the *Caput Mortuum*) is left, with the Particles of which, the maſs of Blood is aggravated, and debilitated; in the mean time, the Saline and earthy parts, are too much exalted, even as is wont to come to paſs in Wine, or Beer, by the uſe of too much Ferment. The Blood, by theſe ways being ſpoiled, evilly

evilly assimilates the provision of the Nutritious Juice, yea also, by reason of the roasting of the Sulphur in the Heart, or defect of it, not rightly Fermenting, or inflamed, it untowardly dispenses the Vital Spirit, in the mean time, from the adust matter, and Salt too much exalted, it grows more fervent than it should, and more wasts it self.

1. From a good Crisis, the Spirit, tho made weaker, yet gets the upper hand, wherefore, what is left of the Feaverish matter, it by degrees overcomes, and expels; and concocts, and assimilates (so what is brought be thin or slender) the Nutritious Juice: from thence, the mass of Blood is amended anew, with Spirit and Sulphur; and the Blood which now being Salt and sharp, did continually grow hot, acquires at length a Sweet and Balsamic Nature, and being quickned with a lively motion and heat, rightly performs the offices of life and sense.

2. From a bad Crisis, the business is otherways, the Liquor of the Blood (like Wine too much Fermented) degenerates, almost into a vappidness or lifelessness; its Spirit is greatly deminished; the Reliques which remain, are intricated, and as it were overwhelmed, with the Particles of adust matter, from whence there is yet a continual growing hot remaining in the Blood, yet without concoction, or assimilation, of the Alible Juice, or separation of the profitable, from the unprofitable: The benign Sulphur, and the Food of the Vital flame, is much consumed, so that the Blood is less inkindled in the Heart, than it ought to be; in the mean time; from the adust recrements, and also the Salt, and Earth being too much carried forth, it perpetually burns in the Vessels, with thirst and heat. And because it is dayly depauperated, the Spirit and benign Sulphur being wasted, and more infected, with the Salt, and Earthy dregs being too much exalted, its Liquor in a short time becomes tastless, and is made unfit for circulation, and for the inkindling in the Heart, for the sustaining the Vital fire: wherefore there is a necessity that life be lost, even as the flame of a Lamp is extinguished, when instead of the wasted Oil, a Salt and Muddy Liquor only supplies it.

3. From an imperfect and doubtful Crisis, when the sick being weakned by a long imbecillity, become not well, but of a long time, the business is after this manner. The Spirituous and Sulphureous parts of the Blood, are very much consumed, by the slow deflagration; the remaining Liquor, being not Purged from the adust recrements and feculencies, is rendred very impure; but when there is yet remaining, somthing of Oil for the Vital Lamp, nor Spirits are altogether wanting, for the subduing the Feaverish matter, the Blood is still circulated, and (tho but smally) is inkindled in the Heart: yea, and by little and little the Spirits recollect themselves, set upon the matter remaining of the Feaver, and what they are able, begin to overcome it: then by a pertinacious assiduity, of coction, like a flame, wavering and half extinct, among green wood, at length rise up victorious, and restore anew, both with heat and motion, leisurely renewed, a quick and lively Fermentation, in the Heart.

So much in general of the Feaver called Putrid: it remains, before we descend to the kinds, and particular Cases of it, that I recount the symptoms, and signs chiefly notable, in the course of this Feaver, and subjoyn the reasons, and causes of them, and their manner of being done.

Chap. X.

Of the Symptoms, and Signs chiefly to be noted, in a Putrid Feaver.

THE Symptoms, coming upon a Putrid Feaver, altho they argue, the œconomy of the whole Body, to be for the most part depraved, and the disposition, and functions of some part, or Member hurt; yet, the accidents, which a Physician ought chiefly to consider, about the Diagnosis of this Disease, and its Prognosis to be rightly instituted, may be referred to three casses or common places; to wit, they have respect to the Viscera of Concoction, *viz.* the Ventricle, and Intestines,

teſtines, with their Appendixes: Or ſecondly, to the humours, flowing in the Veſſels, *viz.* the Blood in the Arteries and Veins, and the thin Liquor in the Nervous parts, together with the chief ſprings of either, *viz.* the Heart, and Brain; or laſtly, theſe ſymptoms reſpect the habit of the Body, with the various conſtitution of the pores, and the extenſion or emarceration of the ſolid parts. They, who would exactly obſerve, the courſe of this Diſeaſe, and would fitly draw out Curatory intentions, may take notice of theſe three heads of ſymptoms, and carefully conſider, what alterations may happen in theſe, as it were diſtinct Regions, according to the different times of the Feaver.

1. Troubles, and diſorders, ſuch as naufeouſneſs, vomiting, want of Appetite, indigeſtion, a looſeneſs, a ſcurfineſs of the Mouth and Tongue, a bitter ſavour, are wont to infeſt about the Ventricle, and firſt paſſages, in the whole courſe of this Feaver. Theſe, for the moſt part, are attributed to the humors, firſt heaped together in the Stomach, and there putrifying: But beſides, that the recrements of the Chyle, being throughly roaſted, by too much heat, degenerate into an hurtful matter, very often, theſe kind of accidents happen, for that the Purgings, and the filth of the Blood, and Nervous Juice, whilſt they grow hot, are carried inward, and being depoſited in the membranes of the Viſcera, provoke Convulſions, and alſo make a filthy heap of vitious, and very infeſtous humor. I have often obſerved, that about the beginning of the Feaver, the Blood growing hot, laid aſide its recrements even inwardly, with a benefit to the ſick, where, altho great moleſtations did ariſe about the firſt paſſages, yet the burning was therefore more mild, the Pulſe moderate, and the Urine laudable, and theſe being after this manner in a Feaver, quickly grew well, with a ſlender diet, and the uſe of gentle evacuations. But if in this caſe I ſhould adminiſter a vehement Cathartic, for the extirpating the humours, that Natural Purging of the Blood being hindred, preſently the Feaver became ſtrong, with a red Urine, and troubled, a deep Pulſe, Watchings, and other horrid ſymptoms: alſo, oftentimes after the ſtate of the Diſeaſe, by this kind of interior Luſtration or Purging, the aduſt matter, and excrementitious, is ſeparated from the Blood. Hence, ſomtimes a Lask, ſomtimes a ſcurfie covering of the Mouth and Throat, follow: Wherefore, there is need of caution, about the accidents which happen in the firſt paſſages, leſt that whilſt we oppoſe them, we ſhould pervert the motion of Nature; and leſt whilſt we fortifie theſe parts, againſt the courſe of the Morbific matter, we untowardly keep the ſame ſhut up, in the maſs of Blood.

The Symptom chiefly to be conſidered, about the Bloody maſs, are, an heat diffuſed through the whole, a burning of the Præcordia, thirſt, a diſorder of the Pulſe, a red urine, a ſpontaneous weariſomneſs, a loſs of all ſtrength, out of which rightly conſidered, theſe things following may be known, *viz.* what the manner of the heat is, or with what tenour the burning Blood flames forth; what times of remiſſion, or of increaſe, its Efferveſcency obſerves, in the deflagration; whether it retains its Craſis, or mixture whole; for the burning of it, and circulation of it inkindled, what ſtrength of the Heart will ſuffice, and what ſpace the Veſſels may require; ſo long as the Blood burns, what plenty of aduſt recrements it may heap up, by what means it may overcome, ſeparate, or at leſt endeavour to ſeparate the ſame, and laſtly, what way of a Criſis it endeavours, and with what ſucceſs.

The accidents, which have a reſpect to the thin Liquor, with the Brain, and Nervous Appendix, are, diſorders concerning ſleep and waking, a debility of the whole Body, a trembling, ſhivering, pains, Convulſive motions, Cramps of the Viſcera, Stupifaction, Phrenſie; and the obſervation of which ſuggeſts, what the temper, and conſtitution of that thin Liquor may be; by what means it waters, and influtes the Nervous parts, and performs its circutes through them; how the Animal Spirits execute the functions of the Viſcera; what the ſtate of the Brain may be, whether it remain free from the incurſion of the Feaveriſh matter, or whether it be not in danger of being overwhelmed, by reaſon of its critical metaſtaſis or tranſlation.

Concerning the habit of the body may be obſerved, what may be the reaſon of ſweating, and the manner of it; whether only by vaporous *Effluvia*? or by ſweats? or alſo by little wealks! whether the fleſh falls away on the ſudden from its wonted bulk? Or whether it retains it ſelf a long while? What the colour of the Face is! And the vigor or habit of the Eyes? from theſe well laid together, the courſe of the Feaver may be beſt of all meaſured; at what time it will come to its hight or ſtanding? Whether Nature will prevail over the Diſeaſe or not; with what manner of ſeparation,

paration, and with what ſucceſs ſhe will endeavor the expulſion of the Feaveriſh matter; alſo by theſe ſigns may be learned, by what degrees the Blood growing hot, and often congealed, doth tend towards Putrefaction, or Corruption; whether it does any thing concoct the alible Juice poured to it; or whether or not it preſently caſts forth of doors, all its proviſion by ſweat, as often happens in the declination of this Diſeaſe.

By theſe ſymptoms and ſigns, a yet more plentiful Indication may be had, if firſt it be known, upon what cauſes the ſeveral ſpecies of them depend; and by what proviſion, they are wont to be raiſed up in our Body: wherefore I have thought it worth our labour to recount particularly the chief of theſe; and to explicate the reaſons of them, and their ways of working. But the ſymptoms, chiefly to be obſerved in a putrid Synochus, or continual fervor without intermiſſions, are, an heat in the whole Body, a ſpontaneous wearineſs, a burning of the Precordia, intolerable thirſt, an ardor, and ſcurfineſs of the Tongue, or Jawes, a pain of the head and loins, pertinacious watchings, Phrenſie, Convulſive motions, a Syncope, Heart-burning, Vomiting, Nauſeouſneſs, want of Appetite, a Looſneſs, a Flux, with which, not all at once, now with theſe, now with thoſe, this Diſeaſe is wont to be beſet.

1. Heat, which is felt ſharp and biteing, in the whole Body, depends upon the too great effervency of the Blood, and the accenſion of it in the Heart: For the Sulphureous or oily part of the Blood, being exalted, and taking an heat, is inkindled in the heart, in a double proportion, more than it was wont; wherefore, it copiouſly diffuſes, by its deflagration, *effluvia* of heat thorow the whole Body. When the Sulphur is leſs diſſolved, and inkindled in the heart, as in the green ſickneſs, or the white dropſical Diſeaſe, *&c.* Heat is wanting in the whole: but in a Feaver, when the Sulphur too much burns forth, Heat ſuperabounds. For heat, depends not only upon the actual inflamation of the Sulphur, or the firing of it, but an intenſe heat is excited without fire, in many mixtures, where the particles of Sulphur are diſſolved by corroſion, or are more thickly heaped together for want of ventilation; wherefore, when Iron is corroded by any acid mineral Spirit, or when Spirit of Nitre is poured on the butter of Antimony, a mighty heat with a fume is produced; in like manner when Dung, or Hay laid up wet, are kept from ventilation, grow highly hot: it is the ſame reaſon, why the Blood burns above meaſure in Feavers, to wit, the particles of the Sulphur, being too much exalted and made hot, are more thickly heaped together in the Veſſels, and are more diſſolved, and as it were inkindled by the ferment of the Heart; wherefore, they every way diffuſe heat, being looſned in the bond of the mixture, and every where ſtretched forth or expanſed.

2. A ſpontaneous wearineſs or laſſitude, is felt in the whole Body: to wit, by reaſon of the Veſſels being diſtented with the boiling Blood, alſo the muſculous fleſh is very much ſtuffed with Blood, and a copious breath, that it is made leſs fit for motion, as they who are ſick of an Anaſarca, have their limbs very unwealdy by reaſon of the aboundance of ſerous humor: beſides, in Feavers, by reaſon of the inflamation of the Blood, the Juice, which is ſent for a ſupply to the nervous ſtock, departs from its due temper, that it becomes little fit, for the actuating the Body.

3. The burning of the Præcordia is made, by reaſon of the Blood being more copiouſly enkindled in the Chimny of the Heart, which from thence boiles forth into the Lungs, with great ardency; wherefore, by how much the neerer this Region is to that fire place of heat, it is pierced therefore with the greater burning.

4. An almoſt unquenchable Thirſt is cauſed, both from the glowing heat in the Præcordia, alſo by reaſon of the ſharp and hot particles of the Feaveriſh matter, affixed to the ventricle, in the circulating of the Blood; which indeed, deſire to be waſhed, even as ſalted and ſpiced meats, being plentifully eaten, or alſo ſtrong, or ſour things, rouled in the mouth, or throat; for this kind of diſtemper, calls for a more free ſwallowing down of Drink, as a member too much heated, the pouring on of cold water.

5. The ardor, and ſcurfineſs of the Tongue, and Jawes, as alſo oftentimes an accretion of a certain white, or yellow, or black filth, happen without doubt, becauſe of the heat, and ſoot, exhaled from the Ventricle, and Lungs, burning with heat: but the Tongue grows white, as often as that humidity, (with which it is naturally much imbued) is dried up, and parched, and ſo the exterior skin of the Tongue, is as it were roaſted, by the burning heat, from hence alſo it becomes ſcurfie; which is alſo ſeen in healthful people, when it happens, that the Tongue is ſcorched by broth, or any other very hot ſuppings; in like manner, as when the Tongues of Animals are boiled, for the uſe of the Table, their skin becomes white and ſharp or rugged. For whether the

ſpittle

ſpittle is drawn from the maxillary glandulas, (as the doctrine of the moſt ingenious *Wharton* hath firſt made known) or any other humor from the glandulas of the Jawes, or elſewhere ; yet becauſe, by the reaſon of the heat, and dryneſs, it grows too thick, and becomes clammy, alſo then the outward skin of the Tongue grows nevertheleſs white ; but alſo it is covered with a certain filthy glew, to wit, becauſe that humor, by reaſon of its thickneſs, may ſmear the Tongue, but cannot wet, or moiſten it : but if it happens, that the Tongue is inwardly ſuffuſed, with a bilous humor, or outwardly tinged (as comes to paſs by the uſe of Choler-abounding Vomits) then its hairy nap, being ſpongy, imbibing the yellow poyſon, exhibits alſo the like colour. If that laſtly, the heat be ſo ſtrong, that it burns the Blood, and inkindles a fire, more ardent than uſual, it follows, that from the fire place of the Heart, the breathing places through the Lungs, ſcarcely ſufficing for the ventilating ſo great fire, foot or ſmoak is raiſed up, which being ſmitten to the furnace of the Pallat, ſtrikes againſt the Tongue, as it were in a reverberatory, and infects it with blackneſs. But this ſame kind of blackneſs, (and as other filthineſſes of the Tongue) is moſt conſpicuous in its middle parts, becauſe the more exterior compaſs, is cleanſed by its frequent rubbing againſt the gums and palate.

6. Somtimes it happens in Feavers, and eſpecially about their declinations, that the Tongue, palat, gums, yea the cavity of the whole mouth, and throat, are covered over with a certain viſcous matter, as it were a whitiſh cruſt ; which being often wiped off, preſently new ſprings again, and unleſs by rubbing diligently, and waſhing the mouth, this cruſty matter be frequently wiped away, the ſick are in hazard of being choaked. This kind of diſtemper, is moſt often excited in Children newly born; for they are wont, for the moſt part, within fourteen days with an external growing hot, to be ſprinkled thorow the whole skin, with broad and red ſpots ; if that this ſuffuſion of redneſs, do not freely break forth, or vaniſhes away ſooner than it ought, for the moſt part, this whitiſh cruſt follows, in the parts of the mouth. This ſymptom, when it troubles Infants, after this manner, is wont to be aſcribed to the fault of the Milk, to wit, that being to ſharp, it induces the ulcerous diſtemper of the mouth. In thoſe ſick with Feavers, it is commonly attributed to thick vapors, and ſoottie, elevated from the ventricle : But to me it ſeems moſt likely, that in either, this diſtemper ariſes, from the impurities of the whole Blood, (and perhaps in ſome meaſure of the nervous Juice) depoſited about theſe parts : for, as often as in the maſs of either humor, any extraneous thing intimately mixed, is contained, that it is not to be diſperſed by ſweat, nor eaſily ſent away by Urine, that, moſt often, is fixed, with the ſerous filth about the mouth ; from whence Catarrhs, tumors, and troubleſom ſpittings are cauſed : For when for the chewing of the meats, the ſalival humor in this place ought to be plentifully ſuffuſed ; nature very often endeavors to ſend forth of doors, what is ſuperfluous, or otherways troubleſome, by theſe uſual ways of excretion. Hence from *Mercury* being taken, when both the Blood, and nervous Juice, are abundantly ſtuffed, with its moſt ſmally divided particles, and endeavor to thruſt them forth, being involved with *ſerum*, becauſe they are not able to exterminate thoſe mercurial little Bodies, being intimately confuſed, neither by ſweat, urine, or by any other ways, what is remaining, they endeavor to expel thorow the Arteries, and other paſſages, which ſupply the mouth with ſpittle, the ſame being involved with the ſerous Latex. Alſo in like manner, in Feavers, when from a long deflagration of the Blood, the aduſt matter is very much heaped together, of which no ſmall part remaining, after the Criſis, is yet confounded with the Blood, and nervous Juice, being fixed either to the brain, or to ſome other place, from them it is at length ſupped up again, 'tis moſt probable, that this matter, is throughly roaſted, by a long concoction, and ſo becomes almoſt like Glew, thick, wherefore, being not able to be diſperſed, neither by ſpittle, or inſenſible tranſpiration, nor to be ſeparated by the urinarie paſſages, but at length leiſurely runs out, by the little Arteries, and other paſſages of the ſpittle, lying open into the Palat, as the moſt uſual way of excretion, and forthwith by reaſon of its thickneſs grows into that glewineſs. The ſame reaſon holds in Infants, whoſe Blood being made impure, by filths contracted in the Womb, preſently it endeavors to purifie it ſelf, by that exterior putting forth, which if it do not rightly ſucceed, by reaſon of the thickneſs of the matter, immediatly the viſcous impurities, are exterminated by this way, as the more open. I have known ſome, in the declination of a Feaver, to whom, not only this kind of Cruſt of gummy matter, has hapned in the parts of the mouth, but a copious ſalivation, as if they had taken mercury, with a ſtinking of the breath,

alſo

alſo a ſwelling of the Tongue, and Gums, hath been raiſed up for many days.

7. The pain of the Head, in Feavers is excited, becauſe of the Meninges of the Brain, being pulled or hauled with vapors, and with a ſharp Blood, and hot; for the Blood being impetuouſly moved, by reaſon of the direction of the great Arterie, is carried in a greater plenty to the Head, than to the lower parts; becauſe the paſſage, from the boſom of the Heart to the head, is ſtrait, from the ſame, to the inferior members, oblique, and as it were reflected; wherefore, as the membranes are very ſenſible, and that there the Blood is ſtopped, and reverberated, in its rapid courſe, it is no wonder, if cruel headaches are excited in Feavers. Beſides, this impetuous flowing of the Blood, wherewith (as it were by a certain Ramming) the membranes of the Head being diſtended, ake grievouſly; alſo ſomtime, Headaches ariſe, by reaſon of the nervous Juice, (which is ſupplyed from the burning Blood) being too ſharp, and pricking: wherefore, when the membranes, and nervous parts, are watered, with the ſame, they being pulled by its acrimony, are moved into Pains and Convulſions.

8. In like manner alſo, the other diſtempers of the Head, as watchings, delirium, Phrenſie, Convulſion, &c. ariſe, ſomtimes from the Blood being in a rage, and ſo ſtirring up inordinate motions in the Brain, and ſomtimes alſo, from the nervous Juice being depraved, and therefore made improportionate, to the regiment of the Animal Spirits: But moſt often, theſe kind of ſymptoms are frequent in Feavers, by reaſon of the tranſlation of the Feaveriſh matter, from the boſom of the Blood, into theſe parts. For the Blood, being full of the aduſt recrements, remaining after the deflagration, endeavors (like the flowring of new Wine) to ſubdue, and exclude them from its Company, by every manner of way; which, a Flux being ariſen, when it cannot expel by Sweat, Urine, or bleeding, it oftentimes tranſfers, to the ſubſtance of the Brain, and there fixes them: and from hence chiefly, the aforſaid diſtempers, when they are fixed, and firmly rooted, draw their original, when as the lighter, and that are eaſily moved, often proceed from the afore-recited cauſes.

9. Convulſive motions, happen in Feavers, for divers cauſes: ſomtimes, becauſe of the matter being heaped together in the firſt paſſages, which there haules the membranous parts, with its notable pravity, and then, by the conſent of the nervous ſtock, the Convulſion is preſently Communicated to the beginning of the Nerves, in the Brain, and by that means draws aſide now theſe, and now thoſe parts: by which means, Worms abounding in the Viſcera, ſharp humors being ſtirred, and ſtrong Medicines, induce Convulſions: or ſecondly, when the Feaver, is a partaker of ſome malignity, ſo in the ſmall Pox, Meaſels, or the Plague, frequently Convulſions happen; to wit, becauſe the Blood is altered, from its benign and natural temper, into a deſtroying and venomous, by which the Nerves, and their beginnings, are pierced, and forced into Convulſions. Alſo, oftentimes without the ſuſpition of malignity, in a putrid Feaver, Convulſive motions are induced, by reaſon of the tranſlation of the Feaveriſh matter, to the Brain, as was but now intimated: ſo I have often obſerved, when the Diſeaſe is not preſently cured with the Criſis, the ſick ly by it, with a tedious ſickneſs, and are made obnoxious to tremblings, and Convulſive motions. Thirdly, and laſtly, for the moſt part in every Feaver, which terminates in Death, Convulſive motions are the ſad forerunners of it; which I think to happen, not only from the malignity of the matter, with which the nervous ſtock is pulled and pierced, but becauſe the Spirits, very much exhauſted and debilitated, do not ſufficiently blow up, and diſtend the Bodies of the Nerves, wherefore, being releaſed from their wonted extenſion, and tonick motion, they are however by a more weak indeavor of the Spirits, agitated into a diſordered motion.

10. A ſyncope or ſwooning, is wont to be raiſed up ſeveral ways in Feavers, but chiefly for theſe three cauſes, to wit, either from the mouth of the Ventricle being diſtempered, which part, as it is interwoven with a manifold texture of Nerves, is very ſenſible, and becauſe from the ſame branch of the ſixth pare, little ſhoots of Nerves, are equally derived to the heart, and to the Ventricle, of the Orifice of the Ventricle, ſo implanted with Nerves, be diſtempered, with any great trouble, it is alſo Communicated to the heart, and either the motion is ſtopped in it, or at leaſt an inordinate one is excited, whereby the equal Flux of the Spirits, and the Blood, is interrupted for a time. I knew one in an acute Feaver, taken with a frequent ſwooning, which diſtemper wholly ceaſed, after he had caſt forth by Vomit, a long and ſmooth Worm. Secondly, a ſyncope alſo, is ſomtimes induced, becauſe the invenomed matter is circu-

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lated with the Blood, which ſuddenly fixes, and extinguiſhes the vital Spirits, and congeals the Blood it ſelf, that it is apt to ſtagnate in the heart, as uſually happens in the Peſt, ſmall Pox, *&c.* of which we ſhall ſpeak particularly hereafter. Thirdly, a ſyncope is wont to happen, by reaſon of the more rare texture of the Spirits, which as they are very tender and ſubtil, are eaſily unbent, by any immoderate motion or pain: ſo I have known ſome, who being quiet in bed, have found themſelves well enough, but being removed from one place to another, preſently have ſwooned away.

11. The pain of the Heart happens in Feavers, when the Ventricle, and eſpecially its Orifices, by reaſon of the manifold inſertions of Nerves, being very ſenſible, are beſet with a ſharp and bitteriſh humor, or elſe with an acid, and corroſive; for hence a pain and trouble ariſes from the acrimony of the humor, after the ſame manner, as when the ſphincter of the fundament is afflicted, in Cholloric dejections, with pain and moleſtation.

12. By reaſon of the ſame cauſe, Vomiting, and nauſeouſneſs are wont to be excited, to wit, by the Ventricles being beſet, and irritated to a Convulſion, from an extraneous matter, and not akin to it ſelf: Such an excrementitious matter, may be gathered together in the Ventricle, by three ways; for either the aliments, partly by reaſon of a want of an acid ferment, by which they ſhould be rightly Cooked, and partly by reaſon of the burning heat of the Ventricle, are roaſted into ſuch a Corruption; or Secondly, this kind of matter, is laid up in the Ventricle, from the Arteries, terminating in its Cavity, as uſes to happen in the ſmall Pox, the Plague, and malignant Feavers; or Thirdly, meer Choler, being preſſed forth from the Choleduct Veſſels, into the empty inteſtine, by reaſon of an inverſe motion, and as it were Convulſive, of that inteſtine, it is poured into the Ventricle, want of Appetite, alſo happens, by reaſon of the Ventricles abounding with vitious Juices, and becauſe the acid ferment, is wholly perverted, by the ſcorching heat. Theſe kind of diſtempers of the Ventricle, and Viſcera, ſomtimes ariſe from an excrementitious matter, (to wit, alimentous, degenerated in the concoction) heaped together, a long while before the Feaver, in the firſt paſſages, which not ſeldom becomes, the occaſional cauſe, of the Feaver it ſelf: but ſomtimes, nauſeouſneſs, want of Appetite, Vomiting, pain of the Heart *&c.* are the immediate products of the Feaver; for when the day before the ſickneſs, thoſe diſtempered, have been well enough in their Stomack, as ſoon as the immoderate heat of the Blood was induced, whilſt it boiled up above meaſure, both the *Effluvia*, and the recrements, being wonted to be evaporated outwardly, alſo the bilous humor, flowing out of the Choleduct Veſſels, are poured into the Ventricle; by which, its Craſis is overthrown; alſo the Reliques of the Chyle, and other contents in the Viſcera, are egregiouſly depraved; from whence, the aforeſaid Diſtempers draw their Original.

14. No leſs frequent a ſymptom in Feavers, is a Diarrhea, or Flux of the Belly, which ſomtime happens about the begining of the Diſeaſe, and ariſes (for the moſt part) either from the Bile, flowing forth of the Coleduct Veſſels, into the *Duodenum*; or from the recrements of the Blood, and Nervous Juice, poured forth from the Arteries, and the paſſage of the Pancreas, into the inteſtines. All the aforeſaid humors, (but eſpecially the Choleric) when they are ſupplied in abundance, often Ferment with the maſs remaining of the Chyme, that the ſame ſwelling up with a ſpumous rarefaction, irritates the inteſtines, and provokes to the motion of excretion: ſomtimes alſo, about the ſtanding of the Diſeaſe, and in the declination of it, a Lask is excited; and ſo, either Nature being Conquereſs, the more thick purgings of the Blood, are this way critically ſifted forth; or being overcome, the Flux of the Belly, is the effect, and ſign, of the Viſcera wholly loſing their ſtrength, and firm tenour. It ſomtimes happens in a Feaver, that the Belly is always bound, that it is not at all looſned, but by Phyſick, and tho the ſick take nothing but liquid things, for many days, the ſtools are ſtill of a ſolid conſiſtence, and hard, this ſeems for the moſt part to be done, when the Blood growing ſharply and exceeding hot, like fire, conſumes the humidities, wherever they flow, and draws to it ſelf, out of the Bowels, the watery matter, by a Copious emiſſion of vapours, and preſently makes it to be evaporated outwardly: wherefore, the thicker part, being left in the inteſtines, is made firm, from the ſcorching heat, as it were a *Caput Mortuum*, remaining after diſtillation.

A Dyſſentery is a diſtemper, ſo frequent in continual Feavers, that ſome years it becomes Epidemical, and not more mild than the Plague, kills many: The cauſe of it is wont to be, not any humor produced within in the Viſcera, that corrodes the inteſtines

teſtines with its Acrimony, (as ſome affirm) but a certain infection impreſſed on the Blood, and ſo intimately confuſed with it, that, under the form of a vapour, or a ſincere humor, it cannot be pulled away from the Blood: wherefore, the thruſting forwards, towards the inteſtines, unlocks the little mouths of the Arteries, and makes there little Ulcers, and exudations or flowings forth of the Blood, like as when from the Feaverish Blood, Puſtles and inflamations break forth outwardly, with a flowring towards the skin: But it is moſt likely, theſe dyſenteric diſtempers, which accompany Malignant, or Epidemical Feavers, ariſe from a certain coagulation of the Blood, as ſhall be more fully declared hereafter.

And here alſo, among the ſymptoms of Feavers, might be recited, what are wont to appear outwardly, in the ſuperficies of the Body, as are Spots, Whelks, Buboes, Carbuncles, *&c.* but becauſe theſe belong after an eſpecial manner to a Malignant Feaver, therefore we will forbear in this place, from the conſideration of them, until we ſhall ſpeak of the Plague, Small-pox, the Peſtilential, and Malignant Feaver.

The Pulſe and Urine ſhall conclude here the troop of ſymptoms and ſigns in a Putrid Feaver, which are much heeded, for the finding out, both the ſtate and the ſtrength of the ſick: For, as there are two things, by which our life is propped, *viz.* Heat inkindled in the Heart, and concoction to be made in the Viſcera, and Veſſels, becauſe the Pulſe and Urine, beſt ſhow the alterations in either, induced in a Feaver, therefore from hence, a moſt certain judgment is taken of this Diſeaſe, about to end, in Death or Health. I think it is not needful, to ſpeak of theſe at large, or to recount the ſeveral cauſes and differences of either: It will ſuffice for me to note here, the chiefeſt things of them, and what are worthy of conſideration in the courſe of Feavers. And firſt of all the Pulſe is conſulted, as it were a Thermometer or Weather-Glaſs, conſtituted by Nature, that from thence, the heat inkindled, in a Feaver might be meted; which if it ſhould be more ſtrong, ſtirs up a great ebullition or boiling up of the Blood, the Artery beats more ſtrongly and quicker, ſo long as the Spirits are in ſtrength; then they being a little exhauſted, the more ſtrong Pulſe is remitted; which however is compenſated with ſwiftneſs, and is made quick, and ſmall. If the Feaver be gentler, and is troubled with a leſſer burning, the Pulſe alſo declines leſs, from its Natural condition, and the moderation of this, in the whole courſe of the Diſeaſe, denotes the truces of Nature. Neither doth the Pulſe only, betray the forces of the Feaver, as of an Enemy, but ſhews alſo plainly the ſtrength of Nature, and her ability of reſiſting. So long as the Pulſe is laudable, the matter goes well, and it ſhews good hopes; but from the evil ſtate of this, a bad omen is ſhewn, and a deſpair of Health. So without a frequent, and diligent examination of the Pulſe a Phyſician connot make a right judgment or Prognoſtication, or ſafely preſcribe Phyſick.

1. As to the firſt thing, it ought to be known (as much as may be) what every ones Pulſe is, according to its Natural Conſtitution; for it is in theſe ſtronger, in thoſe weaker: then it is to be conſidered, in every moment of the Feavers, by what degrees it is diſtant from its Natural ſtate: for now it is ſomtimes more vehement, and argues the Feaver to grow ſtronger; now it is depreſſed, below its wont, and denotes the Spirits and Strength dejected.

Thoſe whoſe Pulſe in Health beats weakly and languiſhing, when taken with a Feaver, if they have a ſmall and weak Pulſe, it is not ſo evil a ſign, that we ſhould preſently deſpair of their Health: In whom the Pulſe is by Nature ſtrong and vehement, if after the Criſis of the Diſeaſe, it hath ſcarce a moderate vigour, tho it be not wholly weak, it argues the condition of the ſick to be ſuſpected, and not ſafe.

If from the begining of the Feaver, before the Blood has flamed out, or if a Criſis being made, when part of the burthen is drawn away, or at another time, without an evident cauſe, the Pulſe becomes weak, it portends evilly: but if after long watchings, or great evacuations, the Pulſe is made a little weaker, Health is not therefore to bedeſpaired of, becauſe the ſtrength caſt down by theſe means, or overwhelmed, may be reſtored, and the Spirits renewed.

When the Pulſe is ſuddenly altered for the worſe tho the ſick ſeem to be better, as to the reſt of the ſymptoms, you may foreſpeak the ſad prognoſtication of Death; and ſo contrariwiſe, altho moſt horrid ſymptoms urge, and yet the Pulſe is laudable, Health may be yet hoped for. If in a ſtrong man, that hath a Feaver, the Pulſe is very ſmall, and creepingly, or becomes like the motion of Ants, death is at hand.

2. In the exhibiting of Medicines, cautions and rules of no ſmall moment are taken; Purging and Vomiting are forbid, by the pulſe being too quick and violent; alſo by being low and depreſſed; becauſe, whilſt the Blood is too fervent, evacuation helps little, becauſe both what is hurtful is not ſeparated, alſo for that by the perturbation, the ſtrength or ſpirits, are more debilitated. But when the ſpirits are broken, and ſtrength caſt down, Medicines caſt them more down, and ſomtimes wholly overthrows them. Wherefore, when a Phyſitian thinks of evacuation, upwards or downwards, he firſt examines the pulſe, and goes about this work only, when Nature is ſtrong and quiet; that ſhe may at once be at leiſure, for the operation of the Medicine, and may have ſufficient ſtrength.

Nor is there leſs need of circumſpection, in ſweating Medicines and Cordials: which, if adminiſtred in the Feaveriſh fit, do too much ſtrengthen, the former violent motion of the Heart, and oftentimes break it ſtrength; alſo, when the Pulſe is very languid, if hot and ſtrong Cordials are adminiſtred, (as when a ſmall flame is troubled with a more ſtrong blaſt of wind) life is eaſily extinguiſhed; wherefore, tis a vulgar obſervation, that Cordials often accelerate death, for that by too much troubling the Blood, they ſooner beat down ſtrength.

There is yet the moſt need of the caution, and direction of the Pulſe, in exhibiting narcoticks; for theſe, (becauſe they perform their work by extinguiſhing, and fixing the too fierce vital ſpirits) if uſed in a weak or inconſtant Pulſe, either by diminiſhing the vital ſpirits, render them wholly inſufficient for the Diſeaſe, or by ſuffocating them too much, cauſe a perpetual ſleep: wherefore, in a languid, unequal, or formicating or creeping Pulſe, opiats are to be ſhun'd, more than a mad Dog or a Snake.

An unequal, and intermitting Pulſe, has a moſt evil report, from the writings of Phyſitians; yet, altho of an ill note, does not ſo certainly pertend death, as a weak Pulſe: for I have known many, to have recovered, tho by thoſe kind of ſigns condemned to the Grave; becauſe the inordination of the Spirits, and the Blood, may be more certainly and eaſily compoſed, or allayed, than their dejection reſtored.

2. The inſpection of Urines in Feavers, before all other Diſeaſes whatſoever, hath more of certainty, and is of greateſt uſe: for from hence, the conditions of the ſick, and of the Diſeaſe are beſt known, and the medical intentions, concerning what is to be done, are better directed; what obſervations, and rules, concerning this thing, are vulgarly ſet forth, are ſo many, that it would be almoſt an infinite labour and tediouſneſs, to recount them all: it will be ſufficient here, to note the chief of them.

Concerning the Urines of perſons in Feavers, there are chiefly to be conſidered, the colour, conſiſtency, contents, and ſubſidency or ſetling. The colour of the Urine, ſhews the meaſure, or exceſs of heat in the Blood; which, as it is increaſed, and becomes more remiſs; the Urine alſo is more, or leſs red; the cauſe of which is, the ebullition of the Blood or the effervеſcency induced from the Feaver, to the Blood; by reaſon of which, the particles of Salt, and Sulphur, implanted in the Blood, humors, and ſolid parts, are more diſſolved, and incocted with the *ſerum*, and impart to it a redneſs; even as, when Salt of Tartar, and common Sulphur being mixed one with another, and boiled in water, impart a deep red colour to the Liquor.

The urines of ſome, are highly red, when they are but a little, or lightly Feaveriſh: and on the contrary, the Urines of others, labouring with a Feaveriſh burning, are leſs coloured. Who abound with lively heat, and a very hot Blood, or are obnoxious to the Scurvy, phthiſis, or hypochondriac diſtemper, when by taking cold, condenſation, ſurfeit, or drinking of Wine, they are troubled by any little Feaver, they render a Urine ſtrongly red: for that the particles of Salt and Sulphur, remain exalted in their Blood, and before half looſned; wherefore, there is a neceſſity, that the Feaver urging, they are more boiled in the *ſerum*; on the contrary, they who are indued with a cold temper, with a faint and weak Pulſe, being taken with a Feaver, with a greater effervеſcency of the Blood, render their Urine leſs coloured.

The conſiſtency, contents, and ſubſidency of Urines, being put as it were upon the ſame thrid, depend all of them on the aduſt and recrementitious matter, which is remaining in the Blood, after the Feaveriſh deflagration: if there ſhall be plenty of this, the conſiſtency of the Urine becomes ſomwhat thicker, and after it has ſtood, it is troubled by the cold: but if there be a leſſer quantity of this, or otherways derived than to the Reins, (to wit, by ſweat, or is called away by a critical tranſlation, to this or that part) the conſiſtency is made thinner, and the Liquor remains clear. Alſo the particles of this matter, do inlarge the contents of the Urine, which ſhew themſelves

ſelves diverſly, according as the nutricious Juice, is now ſomwhat cooked, and aſſimilated by the Blood, now altogether perverted, and carried into a putrifaction, ſome ſigns of concoction, and aſſimulation, ſhew themſelves, in the Urines of Feaveriſh perſons, now a laudable Hypoſtaſis, now ſome marks and rudiments of the ſame: A want of Hypoſtaſis, and the confuſion, and perturbation of the Urine, denote the concoction vitiated, But as this matter is more or leſs roaſted, in the Blood, the contents are now of a pale, now of a red colour, like oker. By reaſon, that the recrements, confounded with the Blood, either the Spirit being ſtrong, begin to be overcome, and ſeparated, or the ſame being depreſſed too much, they are leſs able to be ſeparated, alſo the contents of the Urine, are wont to be more or leſs, ſooner or ſlower ſeparated, from the reſt of the Liquor, and to ſink down towards the bottom.

As to the Prognoſticks, to be taken from the Urine, we may take notice, that the colour of the Urine being ſomwhat more remiſs, the conſiſtency mean, the contents few, and the ſubſiding free or eaſily collected into a Cloud, portend good: on the contrary, a deep red, a thick and troubled conſiſtency, thick and cloudy contents, which ſlowly or ſcarce at all ſink to the bottom, denote a very great heat, plenty of aduſt matter, and its being brought under, and ſecretion, difficult or fruſtrated.

As to the Medicinal directions, the buſineſs depends on this, that we attend, by the frequent inſpection of the Urine, the motion of Nature, and be helpful to the ſame; neither is it to be moved, by purge or ſweat, but when a certain hypoſtaſis of the Urine ſhews ſigns of concoction and ſeparation. I thought it needleſs to ſay any more here concerning this matter, becauſe thoſe things are more largly handled elſewhere, in a proper place, which belong to Urines.

Chap. XI.

Of the Kinds, and Cure of a Putrid Synochus, or continual Feaver.

And thus much for a Putrid Synochus in general, in which is deſcribed its formal reaſon, according to the accidents and ſymptoms which are commonly obſerved in its Figure; there are beſides, (I ſhall not ſay ſpecies but) ſome varieties, or irregularities of this Diſeaſe, in which, this Feaver ſomtimes declines from this common Rule, and by reaſon of ſome accidental Diſtempers, gets new names and diſtinctions.

In the firſt place therefore, a Putrid Synochus is wont to be divided into Symptomatick, and eſſential; It is called Symptomatick, which draws its beginning from ſome other Diſtemper, or Diſeaſe before excited in the Body, ſo that the Feaver, is only a ſymptom, coming upon that other Diſeaſe: of which ſort is accounted, what depends upon the ſquinancy, pluriſie, the inflamation or impoſthume of the Lungs, or any impoſthume from a wound, or ulcer in a principle part, or its neighbourhood, of which we think a little otherways, *viz.* That truly no Putrid Feaver is merely Symptomatical; perhaps it may ariſe occaſionally, from ſome other Diſtemper; but it is founded immediatly, in the Sulphureous part of the Blood being made too hot, and as it were inkindled: for without a Procatarſis, or preceeding indiſpoſition of the Blood, the aforeſaid Diſtempers, rarely, or not at all, cauſe a Putrid Feaver.

As to what reſpects the ſquinancy, pluriſie, the inflamation or impoſthume of the Lungs, and the like; I ſay, that theſe are the products of the Feaver, or Diſtempers following it; but by no means the cauſe of it; for moſt often the evident cauſe, went before, which produced the Feaveriſh effervescency of the Blood, as a taking of cold evacuation being hindered, *&c.* then, altho the ſick do not openly grow preſently into a Feaver, yet a greater ebullition of the Blood, than was wont, is ſtirred up, as may be eaſily conjectured from the Urine, Pulſe, and inquietude of the whole Body. After ſome days, (nhw ſooner, now later) an Inflamation is brought forth, in one part or other; the reaſon of which, may probable enough be ſaid to be of this ſort: The

Blood, by reaſon of the *effluvia* being retained, (which are like ferment) is increaſed in its bulk, and grows more turgid than its wont, in the Veſſels; and when for want of Ventilation, it is ſtreightned in the ſpace of its circulation, it eaſily ſprings forth, where it can find a paſſage, through the Arteries, and being extravaſated, from the broken thred of Circulation, it gathers together into a Tumor: and becauſe from this kind of tumor, an heat, and pain, are increaſed in the part, the Blood is more diſturbed in its motion, and ſo the Feaver, at firſt inkindled, is more aggravated.

Further, in theſe kind of Diſtempers, we may take notice, of a certain aptitude of the Blood to be coagulated, whereby it is made leſs fluid, ſo that it is apt to be congealed in the leſſer Veſſels: even as it is to be perceived in Milk, when it begins to ſour, for then it will not be boiled, nor heated over the fire, without coagulation: and in like manner, there is to be ſuſpected in the Blood, a certain diſpoſition to growing ſour, by reaſon of which, it is made more obnoxious to coagulation; for it eaſily appears, that in a plurifie, a peripneumonia, the ſquinancy, and the like Diſeaſes, the inflamation, or extravaſation of the Blood, does not always depend on the exuberancy of the Blood, and plenitude of the Veſſels: for oftentimes, the Blood is ſtopped in its motion, with a weak pulſe, and a ſinking down of the Veſſels, and being extravaſated in the ſide, or elſewhere, cauſes a moſt acute pain, yea being driven from one part, by and by it is fixed in another: and ſomtimes it begins to ſtagnate in the heart it ſelf, and there oftentimes induces a deadly oppreſſion: wherefore, ſome pluritical people, are wont, when the pains are gone, to complain of a great burthen, and as it were weight, fixed about the region of the Heart: And when we have opened the dead Bodies, of ſuch as have dyed of theſe kind of Diſeaſes, we have ſeen the Blood to be gathered together, in little bits, or oblong gobblets, in the ſecret parts of the Heart, and round about the cavities of the Veſſels. But for that theſe Diſeaſes, are wont to be handled apart from the Feaver, therefore we ſhall ſay no more of them here.

It only remains, that we inquire, whether the Feaver which accompanies theſe Diſtempers, is to be eſteemed in the rank of thoſe, that are called Putrid, or not? To which we reply, that moſt often, they are ſimple Feavers, in which only a ſubtil, and ſpirituous part of the Blood is inflamed; and therefore, if the extravaſated Blood may be reſtored to circulation, by a plentiful detraction of the Blood, or an emptying the Veſſels by ſweat, preſently the growing hot of the Blood is appeaſed, and the Feaver ſhortly allayed. But ſomtimes, when a prediſpoſition, as in a Plethora, or fulneſs of good humor, or in a great Cacochymie or fulneſs of evil Juices, brings it on, together with the ſame kind of diſtempers, a Putrid Feaver is inkindled, wholly from the ſame cauſe.

Among the ſymptomatick Feavers, is reckoned that which is commonly called the ſlow Feaver: they who are ſick of this, are more than uſually hot, eſpecially after eating, any motion, or exerciſe; the Urine for the moſt part is red, the Spirits are feeble; and ſtrength caſt down, as to their appetite, and reſt, they are indifferently well, they have neither Cough, nor much ſpitting, but they daily (like thoſe in Conſumptions) grow lean, without any evident cauſe. The fault for the moſt part is aſcribed, to obſtructions in ſome inward, (as the liver, ſpleen, or meſentery) by whoſe default, the aliment is not well Cooked, nor rightly diſpenſed. But it ſeems to me, that this ſort of diſtemper, is immediatly founded in the evil diſpoſition of the Blood, by which it is inclined, into a too ſalt and ſour temper, and therefore is rendred leſs apt for nutrition, and an equal circulation. For the Blood in the Heart, juſt like oil in a Lamp, if it redounds too much with ſaline Particles, is inkindled not pleaſantly, and equally, but with a noiſe, and great evaporation of the parts; whereby indeed, it is ſooner waſted, and exhibits but a languiſhing, and weak flame. I opened one, ſomtime ſince dead of this Diſeaſe, in whom the Viſcera deſtinated to concoction, were well enough, but the Lungs were without moiſture, and dry, and beſet throughout with a ſandy matter like Chaulk. Alſo oftentimes, in this Diſeaſe, the Meſentery is beſet, the glandules being filled with ſuch a Chaulky matter: But whether the Blood being made more ſaltiſh, doth firſt bring in theſe kind of diſtempers of the Viſcera, or whether the Dyſcraſie, or evil diſpoſition of the Viſcera, firſt brings it upon the Blood is uncertain: it ſeems probable, that either diſtemper depends upon the other, and that the cauſes of either evil are reciprocal.

But the Feaver, which chiefly deſerves to be called *Symptomatic*, is that which is excited in Phthiſical perſons, from an Ulcer, or Conſumption of the Lungs. For the whole Blood, whilſt it paſſes thorow the Lungs, in its circulation, often impreſſes on this Inward,

Inward, the ideas of very many Diſeaſes; and on the other ſide, receives the ſame from it, being evilly affected, whatſoever impure thing is conteined in the maſs of the Blood, as the flowring of New Wine, is caſt forth by extremities of the Arteries; wherefore, when Nature being made more weak, it cannot transfer its recrements into the ſuperficies of the Body, it depoſes them, by a more near Purgation into the Lungs. From hence a Cacochymia, or fulneſs of ill juices, and many Chronical Diſeaſes, end in a Conſumption: in like manner, when the fleſh of the Lungs waſts, or abounding with an Ulcerous matter, becomes half putrid, the Blood paſſing through it, is infected with the purulent matter, or tabid infection, and for that cauſe, is ſtirred up into a continual Effervescency, by reaſon of the confuſion of ſomthing not miſcible, and wherefore, it induces an aſſiduous Feaver, and wholly perverts the Alible Juice. The ſame reaſon is, of Feavers, form an Ulcer, or Impoſthume, oftentimes raiſed up in other parts: for theſe, even as the tabid conſtitution of the Lungs, cauſe oftentimes a Conſumption, and Hectick Feaver. The full conſideration of theſe, are not for this place, wherefore, we will return, whence we have digreſſed, to a Putrid Feaver properly called, or eſſential.

The Eſſential Putrid Synochus, is wont to be divided, into a Putrid (ſuch as is already deſcribed) into a Cauſon, or hot burning Feaver; and beſides into a Quotidian, Tertian, and Quartan: The Putrid Synochus, but now delineated, ought to be the rule or ſquare of the reſt, to whoſe type, moſt Feavers, which are of this kind, are to be compoſed. As to the reſt, but now mentioned, according as they vary their kind, I ſhall briefly ſubjoyn.

The Cauſon, or Burning Feaver, is that which performs its courſe, with a greater heat, almoſt intolerable thirſt, and other ſymptoms, arguing a greater inflamation of the Blood: The formal reaſon of it, by which it is differenced from the reſt, conſiſts in this; that the temper of the Blood is hotter, that is, abounds more with fireable Sulphur; therefore, when it grows fervent, it is inkindled in a greater plenty, and with its deflagration, diffuſes the *Effluvia* of a moſt intenſe heat, through the whole Body: its motion is acute, and quickly comes to its ſtanding, it is compaſſed about with more horrid ſymptoms, hath a difficult Criſis, and an even full of danger.

But as to what reſpects thoſe periods, or fits, in which a Putrid Feaver ſomtimes is wont to be more cruel, at a ſet time; and (as if intermitting) now every day, now every third, or fourth day, repeats as it were the Feaveriſh fit; the reaſon of this ſeems not eaſily to be explicated: eſpecially, if we reject from this cenſe, the fewer humors, to the ſpontaneous motion of which, this diſtemper is commonly aſcribed, concerning this matter, what ſeems moſt likely to me, I ſhall doubtingly propoſe. In a continual Feaver, there are two chief things, (as we have already noted) which for the moſt part, induce the Effervency of the Blood; to wit, the exaltation and inkindling of the Sulphureous part of the Blood, then conſequently, an heaping together of the aduſt matter, and remaining after the burning of the Blood, to a ſwelling up: upon the former the continuance of the Feaver, upon the other, its ſtanding, and critical perturbations, depend: to theſe ſome times, a certain third thing happens, to wit, a fulneſs, and ſwelling up of the crude Juice, from the Aliments newly taken; which in a continual Feaver, (as in the fits of Intermitting Feavers) induces a greater Effervency, at ſet intervals of times. But why this does not always happen, nor wholly after the ſame manner, the reaſon is this: when the Putrid Synochus is very acute, and the whole Blood almoſt is quickly inflamed, and highly rages, whatſoever of Nutritious Juice, is poured to the Blood, is preſently burnt, and conſumed by the fire; wherefore, little or nothing of it, is conteined in the maſs of Blood, for the matter of a fit. But if this Feaver be leſs acute, and the Blood only flames forth moderately, and in parts, the ſupplement of the crude Juice, is not wholly conſumed, by the burning; but is perverted, by a more gentle fire, into a Fermentative matter, which, when it ariſes in the Veſſels to a fulneſs of ſwelling up, conceives a Flux, and by its Effervency, makes ſtronger the Feaveriſh heat, before glowing in the Blood, as it were by the coming of new fewel. The flowring of this matter doth not ſeldom begin with a light ſhivering, or cold, and ſomtimes end with ſweat: but for the moſt part, it is exhaled by inſenſible tranſpiration. In every fit, beſides the proviſion of the degenerate Nutritious Juice, ſomthing from the aduſt, and burnt matter of the Blood, evaporates; wherefore, the Criſis of the Diſeaſe, is drawn forth longer, that tis hardly cured, under eleven or fourteen days; yea (for the moſt part) in this ſort of Feaver, with fits and remiſſions coming between, the perfect Cure of the Diſeaſe happens, ſcarcely within twenty days: and ſomtimes leiſurely, without any

any through Criſis, it remits, and then, by a long declination, it is ended in Death, or Health.

But that this kind of remiſſion, and acerbation or growing more violent, are varied, according to the type of an Intermitting Feaver, that they repeat their turns now every day, now every other day, and ſomtimes not but within four days, the reaſon of this is to be ſought, from the Doctrine before delivered, of Intermitting Feavers: to wit, that according as the Dyſcraſie of the Blood, diverſly appears, the ſuppliment of the degenerate Nutritious Juice, ariſes to the fulneſs of ſwelling up, either ſooner or later; and for that reaſon, its Effervency, cauſes now more frequent, now more rare fits in this Feaver.

Concerning the Cure of Putrid Feavers, of every kind, there are four general intentions, on which, the whole ſtreſs of the matter depends. Firſt, that the Blood, (if it may be done) may be defended from burning, and the flame, or fire inkindled in its Sulphureous part, be wholly ſuppreſſed; which about the firſt beginning of this Diſeaſe, happens to be often brought about. Secondly, that when the Blood having taken fire, cannot be preſently extinguiſhed, that at leaſt it may perform its burning more mildly, and with leſſer hurt. Thirdly, the deflagration being ended, that the Liquor of the Blood, be freed from the recrements of the aduſt and burnt matter, and afterwards reſtored, to its Natural temper and vigor. Fourthly, that the ſymptoms chiefly troubling may be timely helped, the which, unleſs taken away, will fruſtrate the work both of Nature and Medicine.

As to particular Remedies, with which theſe intentions may be ſerved, there are various preſcriptions, and forms of Medicines, not only among Phyſicians, but alſo among old women and Emperics, ordinarily in uſe: from which however, like a Sword in a blind mans hand, uſed without difference, and exact method of healing, more hurt than good, moſt often accrues to the ſick. There will be no need here to repeat the forms of Purges, Cordials, and of other Medicines, eligantly enough delivered among many Authors: I will add in few words, ſome chief indications, and Medical Cautions, which ought to be obſerved in the courſe of this Feaver, according to its various times, and divers ſymptoms.

1. At the firſt beginning of this Diſeaſe, the buſineſs will be, that the Feaver may be preſently ſuppreſſed; and the inflamation of the heated Sulphur, may be inhibited: to which, the opening of a Vein doth chiefly conduce; for by this means, the Blood is eventilated, and the heated Particles, too much heaped together, and almoſt ready to be fired, are diſſipated one from another: as when Hey, apt to burn, if expoſed to the open Air, its firing is prevented. Beſides, let a ſlender diet be inſtituted, in which nothing Spirituous or Sulphureous ought to be adminiſtred; The Viſcera, and firſt paſſages ſhould be freed from the load of excrementitious matter; wherefore, Clyſters are of neceſſary uſe; ſomtimes alſo Vomits, and gentle Purges; by which, ſomtimes timely and with judgment adminiſtred, the Feaver preſently after the beginning, is extinguiſhed, the Food of the fire being drawn away. If that notwithſtanding this method the burning ſpreads more abroad, and more and more, dayly ſnatches hold of the Sulphureous Particles of the Blood; it muſt be indeavoured, (as much as may be) that the deflagration proceed gently, without great tumult.

2, When the Feaver is augmented, if the Blood be too hot, and diſtends the Veſſels very much, with a vehement and ſtrong Pulſe; if watchings, a Phrenſie, or a pain of the Head cruelly urge, the letting of Blood may be again repeated; Tranſpiration (as much as may be) ſhould be freely procured, wherefore, let the ſick keep in bed, for the moſt part; let the diet be ſparing, of the moſt ſlender Aliments, alſo drink ſmall, and plentiful, that the burning Blood, may be diluted with a more plentiful *Serum*: Clyſters are adminiſtred ſafe enough, and in truth commodiouſly; but Medicines, whether Cathartics, or Diaphoretics, and which too much exagitate the Blood, are to be ſhunned, with the ſame induſtry, as blaſts of wind to burning houſes: but rather Opiates, and Anodines which fix and bind up the Blood, and Spirits, are to be made uſe of; alſo Juleps, and Decoctions, which refrigerate the burning Viſcera, attemper the Blood, and cheriſh the Spirits, are often to be exhibited: acetous Liquors of Vegetables, or Minerals, alſo putrified Nitre, becauſe they reſtrain the rage of the Blood, and extinguiſh Thirſt, are truly convenient. Hot waters, and Spirits, Cordial, and Bezoartic powders, (ſo long as the Diſeaſe is not malignant) are not to be meddled with. If that the Blood be unequally circulated, and is carried more towards the Head, than the Feet, Epithemas are profitable, of the warm fleſh, or Inwards of Animals, applyed to the ſoles of the Feet.

3. When

3. When the Feaver is at its ſtanding, the motion of Nature is diligently to be attended, whether it will make a Criſis, or not; Wherefore, nothing raſhly is to be attempted by the Phyſician; the opening a Vein, or ſtrong Purgation, is wholly to be forbid; but after that the Feaveriſh burning is ſomwhat remitted, from the deflagration of the Blood, and ſigns of concoction appear in the Urine, if that the motion of Nature be ſlow, a Sweat, or gentle Purge may be admitted; which hoever are better, and ſafer done, by the Phyſician, when Nature firſt, by a critical motion, hath entered upon the ſecluſion of the Morbific matter. If that all things are crude, and troubled, the Urine yet turbid, without ſediment, or ſeparation of parts, if the ſtrength be languiſhing, the Pulſe weak, if there be no Criſis going before, or only in vain, any evacuation, either by Sweat or Purge, is not to be attempted, without manifeſt danger of life: but it muſt be longer ſtaid for, that the Spirits of the Blood may recover themſelves, may by ſome means overcome the excrementitious and aduſt matter, and then by degrees may ſeparate it, and put it forth; in the mean time, the Spirits are to be cheriſhed, with temperate Cordials, the immoderate Effervency of the Blood (it it ſtill be) is to be ſtopped, and its due Fermentation ſuſtained, which in truth is beſt performed, by Corals, Pearls, and ſuch kind of powders; which indeed are diſſolved by the Ferments of the Viſcera, and then Ferment with the Blood, and greatly reſtore its weak and wavering motion. In the mean time, (whilſt Nature is labouring) all obſtacles, and impediments are to be removed, and eſpecially the proviſion of excrements, heaped up in the firſt paſſages, is to be brought away, by the frequent uſe of Clyſters.

4 By what way or method, the ſymptoms chiefly urging, ought to be handled, will not be eaſily preſcribed by certain Rules; becauſe, they themſelves require ſomtimes to be preſently appeaſed, and quieted, and ſomtimes to be quickned forward: and what is ſomthing more, perhaps at another time, they are to be left wholly to Nature. Some of theſe are too oppoſed, with gentle and lenitive Remedies, but others with more ſharp and irritative Phyſic: yet in the mean time, it is a precept to be held in all, that you dilligently wait upon the footſteps of Nature: which if it works wrongfully, its diſorder is to be reduced; if rightly, yet too vehemently, to be bridled: If ſhe works rightly, yet too ſlowly, or more weakly than ſhe ſhould, the buſineſs will be, that her endeavour may be incited, and helped, by the help of Medicine.

5. In the declination of the Feaver, when after a perfect Criſis, Nature is ſtronger than the Diſeaſe, the buſineſs goes well, nor is there much buſineſs left for a Phyſician: It only remains, to propoſe an exact manner of diet, that the ſick may ſoon recover ſtrength, without fear of relapſing: alſo it is requiſite, to exterminate the Reliques of the Feaveriſh matter, with a light Purgation. About Diet, they often fall on the Rock of relapſing, *viz.* by the too haſty eating of fleſh meats, or more ſtrong Food, the ſick relapſe into the Feaver: for when the Viſcera are weak, and the Aliments (unleſs very ſlender) not eaſily digeſted, and when alſo the diſpoſition of the Blood, is weaker, that it does not aſſimilate the more ſtrong nouriſhing Juice; if any thing improportionate is brought to either, the regement of Nature is again perverted, and all goes ill. Wherefore, thoſe growing well, ſhould for a long time refrain from fleſh, and when at length they uſe it, it ſhould not be unleſs the Urine ſhall be like that of healthful people, and no more troubled by the cold: and then indeed it will be ſafeſt, to begin with broths made of fleſh, and then by degrees, to proceed to more ſtrong Aliments.

6. When from an imperfect Criſis, things are grown doubtful, and remain yet undetermined; then is the Phyſicians moſt difficult task: The motions and ſtrength of Nature are carefully to be waited on, whether it begins to prevail on the Diſeaſe, or to yield to it: If ſigns of concoction appear, and that there is ſtrength, a gentle evacuation, and only by leiſure, is to be celebrated. In the mean time, the ſymptoms moſt urging, are to be ſuccoured, with convenient Remedies, all impediments to be taken away, and ſtrength is to be ſuſtained (as much as may be) with Cordials, and a right manner of living or diet.

7. When from an evil, or no Criſis, all things turn to the worſe, and when the Phyſician almoſt diſpaires of Curing the Diſeaſe, he may predict its event ſuſpected, and much to be feared, But yet, he ought not to truſt to a naked Prognoſtication, to hinder all things elſe, but that as yet, what is in the Medical Art, ſhould be conſulted for Health, tho deſperate: Remedies may be adminiſtred, to the ſymptoms moſt infeſting; the Spirits of the Blood almoſt extinct, may be reſtored by Cordials. When we deſpond of Health, life ſhould be prolonged as long as it may, and at leaſt a fair exit procured.

According

According to the various types but now described, of a Putrid Feaver, I might readily add very many Historics of sick people, and particular observations, made about their Cure; for these kind of examples are usually met with in our dayly practice, so that they are sufficient to fill a great Volumn; out of these however, with the good leave of the honest Reader, I will briefly propose some few, respecting the several kinds of the aforesaid Feaver, by which their Doctrine, and Method of healing them, above delivered, may be illustrated.

A Noble Matron, about fifty years of Age, of a slender habit of Body, little stature, indued with a ruddy Complection, when on the fifteenth day of *June*, by reason of the Summers heat, she had put on more thin Garments, than she was wont, felt herself ill in the Evening; from thence she was distempered with a nauseousness, and oppression of her Stomach, she felt wandring pains, troubling her now in her shoulders, now in her back, very thirsty, yet without any immoderate heat: on the second, and third day, almost after the same manner, on the fourth day after a Vomit, *Viz.* of the infusion of *Crocus Metallorum* one Ounce given, she cast forth yellow bile four times, and had three Stools, and seemed to be eased: the night following, she slept something better: but on the next day, the Feaver being throughly inkindled, she complained of thirst, a burning of the Præcordia, and of a pain, now in her side, now in her back; presently blood was taken to eight Ounces, her Urine was of a very deep red, thick, and troubled without any Hypostasis, or setling of the Contents, her Pulse unequal, and often intermitting, the following night without sleep: on the sixth day of the Disease, early in the Morning, a small Sweat broke forth, from whence the heat something abated, which in the Evening again grew stronger: on the seventh day, a very acute heat, with thirst, burning, an inordinate and intermitting Pulse, as also with a mighty restlessness, and tossing of the whole Body troubled her, on the eighth the symptoms were somwhat more remiss, also in the Urine some marks of an Hypostasis; she took that day posset-drink, with Meadow-sweet boiled in it, and sweated plentifully; and was cured of her Feaver. All the time of her sickness, for Food they gave only small Beer, Posset drink, Barly broth, or Grewel, also frequently Clysters; Drink, and a cooling Julep, they gave her at her pleasure.

This Noble Lady, through transpiration being hindred, fell into a Putrid Synochus: the *Effluvia*, wont to be evaporated through the skin, being retained within, (together with the Choler flowing out of the Choleric Vessels) and fixed to the Viscera, did overthrow the dispositions of their parts, and especially gave trouble to the Stomach, and raised up pains and Convulsions, in the parts filled with Muscles and Membranes: the Pulse was unequal, and intermitting, not because of the malignity of the Disease, as in the Plague, but by reason a certain proper disposition of the Heart, by which indeed, its ferment being not well constituted, the Blood growing fervent, is not presently equally inkindled, and wholly leaps forth, but a part of the Blood, in flowing in a small, then a greater, and after some turns the graateſt proportion, stoping for a moment of time, in the Bosoms of the Heart, produces the unequal and intermitting Pulse. I have known in many others, clearly, the like distemper of the Pulse: to wit, so long as they were free from intemperance, the Pulse was altogether equal, and orderly, but if they were more strongly heated than usually, by any sudden passion of the mind, or too great agitation of the Body, presently they were affected with an unequal Pulse, and between the vibrations or strikings, intermitting perhaps 4, 7, 10, or 20. and as often as they fell into a Feaver, the Pulse shewed it self after this irregular manner. When this habitual irregularity, concerning the Pulse, was not yet made known to me, by frequent experience, I was wont to suspect still a malignity in the Disease, and to foretel a fatal event, which hapned otherwise.

On the fifth day, in this sick person, the Feaver, although slowly inkindled, came to an augmentation, and from thence past through the rest of the stations with a swift motion: on the sixth a light emptying of the adust matter, arising to a fulness, a sweat being risen, and so a certain remission of the Feaverish heat followed: on the seventh day, this adust matter arising to its height of increase, made the standing of the Disease, to which, at length on the eighth day, a plentiful sweat, with all things requisite to a good Crisis, followed, and perfectly Cured the Feaver: because (as it ought to be) those three things went before this critical evacuation, *viz.* first a full and sufficient deflagration of the Blood, as appeared by the very strong heat, and plainly fiery, continued for three days before: also secondly, a congestion of the adust matter to a plenitude, as was collected by the high disquiet, and tossing about the preceeding night;

and then a certain Pepaſmus or Concoction of the ſame matter, and a begun ſecretion in the Blood, which a ceaſing of the ſymptoms and ſigns of Concoction in the Urine, ſhewed: wherefore, the Copious ſweat, coming upon ſo laudable a ſign, ſo long as there was no ſuſpition of malignity, portended nothing but good.

About the beginning of the year 1656, a Gentleman endued with an active habit of Body, without any manifeſt cauſe, (unleſs that being much addicted to ſtudy, he uſed no exerciſe after it) became ill; at firſt he complained of a nauſeouſneſs and want of Appetite, with a great Headach: on the ſecond day, he was affected, now with a ſhivering, now with heat, ſeveral times reciprocating, beſides, with thirſt, and burning of the Præcordia, with a ſcurfieneſs of the Tongue, and an ingrateful ſavour. On that day, he took ten drams of an Emetick Liquor, by which he Vomited ſeven times, and caſt up a great quantity of yellow bile, and had four Stools; the night following he was unquiet, and almoſt wholly without ſleep, and in which the ſick perſon grew more Feaveriſh, with an increaſed heat: on the third day, when the aforeſaid ſymptoms were grown worſe, he was let Blood to ten Ounces: his Urine was red, thick, and with a copious ſediment; his Pulſe quick, and vehement; at night he ſweat a little, with a ſhort ſleep, but diſturbed: on the following morning, he ſeemed to be a little eaſed: yet in the evening all things grew worſe, with moſt ſtrong wakings, heat, and thirſt: on the fifth day, by a light ſweat, the heat ſomwhat remitted, which yet a little before the evening, returned with its wonted fierceneſs, The night again was wholly without ſleep, with a continual toſſing up and down of his Body: In the morning, by a little gentle ſweating, he felt a little eaſe; in the evening an encreaſe again of all things more cruelly; the night alſo was very unquiet: about the beginning of the next day, a ſweat, as before ſucceeded, and a little more plentifully: on this day was a manifeſt change towards health; the heat and thirſt was a little leſs vehement; his Urine was leſs red, with ſome Hypoſtaſis; thence, for three days, the Feaver leiſurly declined; yet every night he had a certain fit, but more remiſs than before, on the eleventh day, he ſweated more plentifully, and was perfectly Cured: all the time of his ſickneſs, he uſed a moſt ſpare diet, taking truly nothing of Aliment, beſides ſmall Beer, and Poſſet drink made of it; he ſomtimes took drink, and cooling Juleps, of boiled Barly, and diſtilled waters; dayly, if his Belly was not looſe of it ſelf, an emollient Clyſter was adminiſtred: he uſed no other Phyſic beſides, to wit, neither Purge nor Cordial. But the Feaver being allayed, he was twice Purged, and from thence quickly grew well.

This Feaver was a Putrid Synochus, as may be conjectured by the ſhivering about the beginning, and then with continual heat, thirſt, watchings, and other ſymptoms grievouſly infeſting, for many days: but foraſmuch, as its intemperature was exaſperated every night, it might be called a continued Quotidian: This Diſeaſe, made its firſt aſſault without any evident cauſe, becauſe the Blood being little ventilated, like Wine growing hot of it ſelf, had conceived an ardour, from the exalted Sulphur; the Choler flowing forth from the Choleduct Veſſels, and likewiſe the Purgings of the ragi g Blood, being poured about inwardly, (as it is wont to do for the moſt part in Feavers) preſently ſtirred up troubles, and diſorders in the firſt paſſages: therefore by reaſon of the excrementitious matter there heaped up, there was procured a depletion, and ſoon after the beginning, a Vomiting: notwithſtanding which evacuation, and likewiſe a more ſtrong Purging of the Belly by Stool, if adminiſtred, the Feaver being wholly inkindled, becauſe they too much agitate the Blood, and diſturb greatly the Concoction of the aduſt Feaveriſh matter, for that reaſon bring more damage for the moſt part than benefit to the ſick: The firſt ſtation of this Diſeaſe, *viz*, until the whole Blood was fired, was extended to the third day; and then from thence, when the Blood flaming forth was burthened with aduſt recrements, its greater ebullition, with a frequent endeavour of expulſion by ſweat followed: on the ſeventh day, when the Blood for the greateſt part had flamed forth, and the aduſt recrements, heaped up in its boſom to a fulneſs of ſwelling up, began to be troubleſom, the critical motion was ſtirred up: by which nevertheleſs, that matter not being as yet wholly ſubdued, nor ready for ſeparation, the Diſeaſe was not perfectly Cured; but after another period, the ſame increaſing, at laſt being ſtirred up, on the eleventh day, brought on that other, and perfectly Curing ſwelling up: in the days between, becauſe, beſides the recrements remaining after the deflagration of the Blood, and reſerved for a Criſis, alſo from the Nutritious Juice not preſently taking fire, but after a peculiar manner depraved, other matter in the boſom of the Blood, apt to a ſwelling up, was gathered together; therefore, from the continual increaſe, and Flux of this, there hapned to this Feaver continual fits, (ſuch as are wont in Intermitting Feavers) on ſet days, and hours.

A ſtudious young man, about twenty five years of Age, of a dark Countenance, and Melancholic temper, without any manifeſt occaſion, began to be ſick, in the Year 1656. At firſt he complained of a Feaveriſh diſtemper with thirſt, a ſpontaneous wearineſs, and want of Appetite: moreover, on the ſecond day, of a pain in his right ſide, and a diſtention of either Hypochondrium, alſo, with almoſt continual Vomiting, wakings, and very great pain of the Head; a Phyſician being ſent for, he was preſently let Blood to twelve Ounces. In the evening he grew more hot, and was light headed, afterwards, a ſweat, tho ſmall ſucceeding, he was better the next morning: on the fourth day again, he caſt up whatever he took preſently, alſo he was troubled with an almoſt continual endeavour of Vomiting. The exhibition of a Vomitory Medicine, propoſed by the Phyſician, both the ſick perſon, and alſo his Friends, taught by the danger of it before, rejected. From a Clyſter given him he had ſix Stools, and ſeemed to be a little alleviated; alſo the night following he ſlept ſomwhat: on the fifth day he again fell into frequent Vomiting, with intolerable thirſt: he burnt inwardly, but outwardly could not be felt any immoderate heat; becauſe the recrements of the effervent Blood, which ought to exhale through the skin, ſeemed to ſtagnate within, and to flow forth into the Viſcera. Therefore in the evening this Bolus was given him, to provoke ſweat. Of Conſerves of Roſes Vitriolate one Dram, of *Gaſcons* powder one Scruple, of *Laudanum* ſoluted in Balm water one Grain: that night he ſlept moderately, and by a copious ſweat following, the ſymptoms ſeemed to be mitigated: Nevertheleſs on the ſixth day, all things again were imbittered, and a through heat, thirſt, and burning of the Præcordia, cruelly tormented him: on the ſeventh and eighth day the Pulſe was unequal, and diſordered, for the moſt part he talked idly, and if moved in his bed, fell often into a ſwound. On the ninth day, the ſame ſymptoms ſtopped, alſo he was troubled with a contraction of the tendons in his wriſts, and Convulſive motions of other parts, that we almoſt deſpaired of life. Becauſe that morning Nature ſeemed to be given over as conquered, ſhe was now to be ſuccoured, with what ever remained of Art. Wherefore, intending a more copious ſweat, as the laſt refuge, I gave him a Dram of Spirit of Harts-Horn, at one time, in a ſmall draught of Cordial Julep; upon which, being for four hours very unquiet and furious, he could ſcarce be held in his Bed; but afterwards ſleep creeping upon him, he ſweat very much, and the buſineſs ſuddenly came to be out of all danger. On the following night, for the continuing of the ſweat, I ordered to be given him, every ſix hours, a doſe of the powder of Contrayerva; the Feaver, and the Diſtempers of the Nerves, ſhortly ceaſed, and the ſick perſon became well.

This Feaver, as to the manner of its figure, may be called a Putrid Synochus; which, in this ſick perſon, from the Blood being made hot of its own accord, like Hay heating, and ſo conceiving an immoderate fermentation, took its original: by reaſon of the Melancholic temper of the Blood, the heat was leſs ſtrong, altho the ſymptoms were otherwiſe worſe, and hapned to be chiefly inimical to the Nervous ſtock: for the Blood burning forth, as fire in a Furnace, covered with chips, glowed with a moſt inteſtine burning: therefore, the ſick complained of the heat of the Præcordia, with an intolerable thirſt, when in the mean time, the exterior parts were but little heated: for this reaſon, and becauſe the Body was leſs perſpirable, the aduſt recrements of the Blood being about to make a Criſis, and which were wont to be diſperſed outwardly, at ſet times, being ſuffuſed inwardly, (Nature being very much oppreſſed, and perpetually provoked) brought on cruel, and almoſt continual Vomitings; wherefore, when the Feaveriſh matter was derived to the firſt paſſages, by ſo frequent an endeavour of its expulſion, before the fulneſs, or concoction, no Criſis followed thereupon. Nor was the ſick man the better for that irregular evacuation, yea, the Blood being ſtill made worſe in its mixture, began to be corrupted in it ſelf, and wholly to pervert the Nervous Liquor; from whence, beſides the aſſiduous Vomitings, frequent Swoonings, inequal Pulſe, alſo Deliriums, and Convulſive motions did ariſe; but foraſmuch, as the mixtion of either humor, and diſpoſition, being not yet wholly looſned, or overturned, the Diaphoretic was adminiſtred, which by reaſon of its great agility, quickly paſt through both the Blood, and the Nervous Liquor, and a lively, and haſty Fermentation being raiſed up anew, carried forth of doors their impurities, and extraneous mixtures; the ſtate of the Diſeaſe tending towards Death, was reduced to Health, and by this means, inſtead of a Natural Criſis, by the help of a ſupplying Medicine, the ſick man, as it were recalled from the dead, quickly recovered Health.

A woman, being about thirty years old, of a ſtrong Body, and Melancholic temper, (as might be gathered by her very auſtere manners) in the third month after her lying in, got cold in giving her child ſuck, and uncovering herſelf, and upon it fell preſenly into

into a ſhivering: To this, a heat more increaſed than uſual, followed, which afterwards, (a light ſweat ariſing) quickly remitted. On the ſecond and third day, ſhe was very thirſty, and without Appetite to Food, yet without immoderate heat, that ſhe could ſcarce believe herſelf in a Feaver: ſhe lay quiet every night, but wholly without ſleep; her Urine was highly red, and with the multitude of Contents, thick, and cloudy, which however not troubled by the cold, remained ſtill after the ſame manner, without Hypoſtaſis, or ſinking down of the parts. On the fourth day, the heat was inkindled throughout the whole, wherefore, a Phyſician being then firſt ſent for, about twelve Ounces of Blood was taken from her Arm; after the letting of Blood, and her Belly the ſame day copiouſly emptied, by a Clyſter, in the evening ſhe fell into a ſweat, by which nevertheleſs ſhe was nothing eaſed, and (tho an Anodine Medicine was given her) ſhe wore out the whole night, (as before) without ſleep. On the fifth day, from a Clyſter being given, ſhe had three Stools, and felt ſome eaſe: her Urine ſtill remained red and troubled: when Blood was preſcribed to be taken from her Ham, the ſick obſtinately refuſed, eſteeming herſelf to grow well; on the following night, when ſhe had lain long without ſleep, and unquiet, ſhe at length was troubled with a fit, ſuch as is commonly called Hyſterical, after a grievous manner; and at firſt, with a certain numneſs, or ſenſe of pricking, poſſeſſing the extream parts of her Body (eſpecially her Feet, Thighs, and Legs) ſhe was affected; and together with a wind, cruelly diſtending the Inteſtines, Ventricle, and Hypochondria: ſhe felt in the bottom of her Belly, as it were a certain bulk to creep upwards; which when it had aſcended to the Heart, and thence to the Brain, the ſick woman preſently was weakned in her Intellectuals, and all the night lay talking extravagantly and idly. On the ſixth day, after her Belly was taken down by a Clyſter, ſhe returned to her ſelf, and remained in her right mind, and ſeemed to be indifferently well. But in the Evening when ſhe was moved in her bed, ſhe began to feel the ſame kind of fit as before, to wit, ſhe had a ſenſe of pricking, as if ſtung with nettles, in all her body, together as it were a round thing rouling about in her belly, which creeping upwards, diſtended the Inteſtines and Ventricle, that ſhe emitted by means of it blaſts, and belchings: for eaſe ſake, ſhe required a draught of cold water. Moreover, the Remedies uſual in hyſterical diſtempers, as Caſtor, the ſmell of *Aſafætida*, the fume of burnt feathers, ligatures, and frictions of the Legs, and the like were adminiſtred, by the uſe of which, ſhe ſeemed for the preſent, free from the aforeſaid diſtemper, and was wholly without it for four hours: but when ſhe lay upon her back in her bed, as ſhe had ſetled her ſelf to ſleep, on a ſudden ſhe complained that the ſame Symptoms, did at once run through her whole Body, and by and by, ſhe fell upon it into a delirium; houling and crying out, ſhe talked idely the whole night; the day following, her eyes being open, ſhe lay without ſpeech or motion: again in the Evening, when her Feaver being increaſed, ſhe grew furious, that ſhe could ſcarce be held in her bed: and ſo ſhe remained for three days, now delirious crying out, and wailing, now as it were ſtupid without motion, or voice; yet ſtill ſhe was tormented with Convulſive motions, about the tendons of the muſcles: on the tenth day, ſhe drew her breath deep, and difficultly, with a weak, and as it were a creeping pulſe, and about the middle of the night died.

This Feaver was of the rank of the Putrid Feavers, which nevertheleſs, by reaſon of the melancholic diſpoſition of the Blood, (as we before intimated) was not very grievous, with heat or burning; but yet being very much infeſtous to the Brain, and nervous ſtock, was more difficult to be cured: The Blood being prediſpoſed to a growing hot, eaſily contracted the diſtemper by taking cold, but yet, from the ſalt, and earthy feculencies, together with the Sulphur being moved, it was not openly inflamed; nevertheleſs, burning with an inteſtine, and as it were ſhut up fire, it was more notably depraved: Hence, preſently from the beginning, the Urine was highly red, and troubled, alſo ſhe continued wholly without ſleep: on the fifth day, the Blood burning forth, and being filled with the recrements, or aduſt matter, was irritated by its plenitude to an endeavor of excretion; wherefore, this night, a ſwelling up being ariſen, it tranſferred its load, not diſperſable by ſweat, into the head, and there affixed it to the Brain, and nervous ſtock: From thence, preſently, the wonted irradiation of the animal Spirits, being diſturbed in the fountain it ſelf, their inordinations firſt hapned to be felt, in the extream parts; wherefore, there was a pricking in the whole Body, the Belly inflated, the hypochondria diſtended, and as it were a certain ſubſtance or live thing, aſcending upwards, and ſucceſſively running through the Belly, precordia, and at length the head: For theſe kind of Symptoms, ariſe not (as it is commonly believed) always from vapors, lifted up from the Womb, and ſtriving or thruſting upwards; but, not ſeldom, from the Brain, and the beginning of the nerves being diſtempered;

ſtempered: for, when the evil is there inflicted, that the animal Spirits nigh their origine, are diſturbed in their motion, neither (as before) blow up, and diſtend the nervous Bodies, preſently the other Spirits, implanted in the extremities of the nerves, being deprived of their wonted influence, begin to tumulttuate, and being moved inordinatly, and towards their beginnings, cauſe Convulſions in thoſe parts in which they dwell. This irregular, and Convulſive motion, begun in the extremities, by the continued paſſage of the Spirits, and of the nervous parts, creeps by and by into other parts, and then to others, ſtill to thoſe nearer to the Brain, till at length, (the whole ſeries of Spirits, like Souldiers being carried ſucceſſively backwards) the Convulſions are continued, into the fountain it ſelf of motion; So as in truth, by this means, the Convulſive motions, are ſometimes begun, a moſt long way, from the cauſe, or place of the diſtemper, as by this only argument plainly appears: to wit, as often as the influx of the animal Spirits, is inhibited in the leg, or arms, by a ſtrict ligature, or by leaning hard on them, a ſenſe of pricking, or a cramp, with a numneſs, is felt, firſt in the foot or hand, which afterwards ſucceſſively aſcends towards the affected part: wherefore, in this ſick woman, by reaſon of the Feaveriſh matter, (to wit, the aduſt recrements) fixed on the Brain, by a critical tranſlation from the boſom of the Blood; and there beſetting the beginnings of the nerves, thoſe Symptoms, imitating the hiſterical diſtemper were ſtirred up: by reaſon of the nerves, (which are diſperſed through the whole Body, by means of the ſpinal marrow) being diſtempered near their original, the ſenſe of pricking begun in the extream parts, by and by is perceived in the whole. By reaſon of a like hurt, of the ſixth pare in the fountain, Convulſions and diſtentions ariſe, firſt in its little branches, moſt thickly ſet about the Abdomen: That aſcent, as it were of a certain ſubſtance, was only a tumefaction of the Viſcera, and muſcles, ſucceſſively inflated or blown up, by the Convulſion; from thence, the ſame diſtemper (by the mediation or coming between of the branch of the ſame ſixth pare) creeping along more upward, and ſtill more near the Brain, the precordia, and then the head it ſelf, (as by a certain vapor raiſed up from beneath) ſeemed to be taken; on the next day, when this Feaveriſh matter, at firſt lightly fixed in the Brain, was at length again amended by the Blood, the aforeſaid Symptoms ceaſed for a time: Then ſoon after (the Blood again flowing, and depoſing its recrements again in the Brain) the ſame kind of diſtemper as before, this ſick woman felt to come upon her; which however, with rubbings, the ſmell of ſtinking things, and other Remedies uſed in the hiſterical paſſion, was retarded for four hours, from its aſſault; to wit, foraſmuch as the animal Spirits, being tyred out by the external object, and irritated into a violent motion, were hindred, that they could not ſo ſuddenly conceive Convulſive motions: but afterwards, when that incitation of the Spirits, outwardly exhibited, did ceaſe, the morbific cauſe ſtill troubling, thoſe Spirits being grievouſly beſet, not ſucceſſively (as before) beginning at the extremities, but on a ſudden, all, both in the Brain, and the nervous appendix, were at once acted into Confuſion. The Criſis being after this manner attempted, *viz.* By the tranſlation of the Feaveriſh matter to the Brain, the event of the Diſeaſe, both in this ſick woman, and alſo in others, whoſe ſickneſſes I have diligently obſerved, for the moſt part hath a mortal ſucceſs. For the Blood, unleſs extreamly depraved, and hindred, ſcarce ever endeavors to purifie it ſelf, by ſuch a Criſis: and as often as it endeavors an excretion by this means, it inflicts on the Brain, and nervous ſtock, an evil, not quickly, nor eaſily to be blotted out: alſo, the maſs it ſelf of the Blood, very rarely, by the motion of ſuch a flowring, is rendred free, from the impure mixture of the Feaveriſh matter.

A learned young man, of a lean habit, and pale countenance, in the coming in of the Spring, being conſcious of no error as to his dyet, began to complain of a wearineſs, and impotency in walking, alſo of a drowſineſs, and ſleepineſs of his head: on the ſecond day alſo, he was tormented with thirſt, want of appetite, and an heat of his precordia: on the third day, the Phyſician being ſent for, he took a Vomit, by which, when he had Vomited three times, and caſt downwards five times, cholerick and hot matter, he became ſomwhat chearfuller, and the night following ſlept indifferently well: on the fourth day, he bled a ſmall quantity; then his thirſt, and heat very much increaſed: his Urine was red, with a copious ſediment, and a little hypoſtaſis. But becauſe, after the ſigns of concoction in the Urine, the endeavour of Nature, as it were oppreſſed, appeared for ſeparation, without ſufficient evacuation, therefore he was let Blood to ſeven ounces, and he ſeemed thereby to be very much eaſed, yet in the evening, all things grew worſe, and then for three days, the Feaver ſeemed ſtill to be increaſed: on the ſeventh day, he complained of a great heavineſs in his head, and of a darkneſs, turning about in his eyes: after noon, an hemorrhage or bleeding copi-

ouſly

ouſly followed, that for the great loſs of Blood, the ſick perſon had almoſt loſt all his ſtrength, and there was a very great neceſſity of medicinal help to ſtop the Blood: For this end, when a vein in his Arm was opened, Ligatures, and proper medicines were applyed, both to his head and belly, and very many other Remedies (the occaſion of haſty curing urging) preſcribed by every body, were tryed in vain; at length, by the perſuaſion of a woman, coming there by chance, a red hot Iron was held to his bleeding noſe, and on a ſudden, from the vapour of the burnt Blood, received into the noſtrils, its Flux was ſtayed; this Remedy, I afterwards knew uſed to many, with very good ſucceſs. This great hemorrhage cured the continual Feaver, to which nevertheleſs, an intermitting quotidian followed, which afterward was quickly cured, by the method of curing already delivered.

This Feaver, beginning without any manifeſt occaſion, and continued for many days with thirſt, and heat, may be called a Putrid Synochus; which yet without any horrid Symptom, about the beginning or ſtanding, was cured by an eaſie courſe, tho at length by a dangerous, and difficult Criſis: The turgeſcency of the Blood in the Spring time, and together the defect of ventilation in the ſame, gave the beginning to this: The Blood burning out, with a Feaveriſh fire, about the fourth day, had heaped up ſomthing of aduſt matter; that flowring it attempted a critical motion, tho with a ſmall hemorrhage: The defect of a more full evacuation, the opening of the vein ſupplyed for a time, afterwards, the aduſt recrements being heaped together, in great plenty, the ſame being not apt to be diſſipated by ſweat, in a body not rightly perſpirable, at the time nature was about to endeavour a Criſis, a mighty bleeding followed. For when the Blood, by reaſon of the ſecluſion of the Feaveriſh matter, is agitated with a critical motion, very many of its particles are looſned from the mixture, ſo that a greater ſwelling up being provoked, they carry forth every extraneous thing confuſed with them: if at this time, the breathing places of the skin, be but little open, the maſſe of the Blood (as new Wine ſtopped up in a bottle of a ſmall mouth) even more notably grows turgid, and becauſe it cannot ſhake off the Feaveriſh matter, by ſweat, it carries it ſelf forth of doors, together with it, any way it can find; wherefore, when there lies a moſt eaſie paſſage, for the boiling Blood, through the veſſels opening into apertures of the noſtrils, from that Port (like the ſame new Wine when the veſſel is opened) being inlarged by a ſpumous refraction, it abundantly leaps forth. The continual Feaver being cured, by this means, an intermitting Quotidian followed, becauſe after a long deflagration of the Blood, and great loſs of it, what Blood was remaining, being very much deprived of Spirit, and the Salt, with the left Sulphur being thorowly roaſted, eaſily contracted that kind of diſpoſition, whereby it was apt, not rightly to concoct the alible juice, but to pervert it into a matter very fermentative.

A Matron, about ſixty years of age, when ſhe had ſat up a certain night, going to bed in ſheets not throughly dry, began to be ill; at firſt ſhe was troubled with a ſuffocating Catarrh, that by reaſon of the ſerous deluge, falling on the ſarynx, ſhe could hardly breath; neither could ſhe ſleep; the next day with a nauſeouſneſs, and want of Appetite, with ſome little exceſs of thirſt and heat: on the third day, an acute pain invaded her in her ſide, with a Cough, and the Feaver increaſed: her Urine was red, and clear, with a laudable Hypoſtaſis, an unequal, and an intermitting pulſe. A Phyſician being ſent for, ſhe was let Blood to ten ounces, alſo that day, her belly was copiouſly looſned by a Clyſter: About night the pain vaniſhed, and ſhe ſlept indifferently: her Urine was then red, troubled, add full of contents: on the fourth day, the Feaver was ſomwhat increaſed: In the evening troubled with a Cough very much, and by and by following thereupon the acute pain (as before) in the ſame ſide; her Urine being again clear, with an hypoſtaſis: Her pain, from her being let Blood again ceaſed; on the fifth day, the Feaver was more remiſs, but at night ſhe was unquiet with heat, and a toſſing up and down of her body, but without pain. The next morning ſhe ſweated plentifully, and was eaſed; then uſing ſtill a ſlender dyet for ſome days, and being once purged, ſhe grew well without relapſing. It is worth obſervation, that whilſt the pain troubled her, the Urine was clear, and with an hypoſtaſis, nor troubled by the cold; which however, the ſame being allayed, became preſently thick, more red, and filled with contents.

This Diſeaſe, becauſe of the acute pain in the ſide, as it were a Pathognomic ſigne, might be called a Pluriſie: but we have here a Feaver, preceeding the pain, and not the product of it; The evident cauſe of the ſickneſs was Tranſpiration being hindred by the conſtriction of the pores; The Blood growing hot, by reaſon of the *Effluvia* being retained, and alſo too much abounding with a ſerous latex, as it were vomiting very much of it, from the Arteries terminating in the Larynx, cauſed the ſenſe of the

ſuffocating

ſuffocating Catarrh: For this kind of diſtemper (as alſo the Cough with great ſpitting) ariſes not, for that the watery humor (as is commonly ſaid) falls from the head, into the throat, and lungs; but becauſe the ſerous Latex is poured forth, now from the pneumonic veſſels, immediately into the lungs, now dropping forth from the Arteries opening into the larynx, falls down on the breaſt; on the third day, from the ſame ſerous humor, with a portion of the Blood, being fixed in the ſide, the acute pain aroſe; for the Blood beginning to grow fervent, when as yet it did contain in it ſelf a crude matter, and (as it ſhould ſeem) ſomthing ſour, from the degenerate alible juice, depoſed the ſame, (becauſe it could not caſt it forth of doors by ſweat) by a proper luſtration or purging through the intercoſtal Arteries, into the membrane ſurrounding the Ribs; and there (as it is always wont in a Pluriſie) either by coagulation, (which may be lawfully ſuſpected) or by the ſhutting up of the veſſels, the Blood being intangled with the ſame matter, is ſtopped in its motion; then being increaſed in its bulk, by a new coming ſtill of the Blood, it cauſes a break of the union, and ſo an acute pain. That in this ſick woman, the ſame kind of matter, diſturbing the maſs of Blood, with a portion of it extravaſated, was fixed about the Pleura, it from thence hapned, becauſe the pain urging, the urine was clear, and not full of contents: then, when the veſſels, by reaſon of Phlebotomie, being emptied, they ſupped up again that matter, into its maſs, before exterminated from the Blood, the urine preſently became troubled, and again big with contents: The pulſe was unequal, and intermitting, becauſe of the idiocraſie or proper diſpoſition, which ſhe was wont to have in every intemperature: for when I cured this woman of a Feaver, many years before, her pulſe being unequal, and intermitting, had ſtruck a fear in me, and others, of a ſad preſage, concerning the event of the diſeaſe, which however at that time, (as alſo in this ſickneſs) ceaſed, proſperouſly, without any horrid Symptom.

A ſtrong young man, and corpulent, after immoderate exerciſe, about the Summer ſolſtice, and then a ſudden cold coming upon the heat, found himſelf ill: At firſt, a want of Appetite, nauſeouſneſs, and cruel pain of the head, as alſo thirſt, and a more intenſe heat than uſual troubled him; on the ſecond day, an acute pain invaded him n his right ſide with a Cough, and difficult breathing; Blood being preſently taken plentifully from the Arm of the ſame ſide, that pain remitted ſomwhat, which yet in the evening returned, being made more cruel by a Cough, and bloody ſpittle. The night followed, without ſleep, and very unquiet: on the third day, he was again let blood, beſides Liniments, and fomentations were applyed to his ſide; Moreover pouders, Juleps, and antipleuretick decoctions, being taken inwardly, about night the pain almoſt wholly ceaſed. Then by and by, he was afflicted with a cruel headach, and a vertigo: on the fourth day, a ſtream of Blood fell from his right noſtril, about two ounces, by which the pain of his head clearly ceaſed, and the vertigo; but in the Evening, the pain in the ſide before diſtempered, returned with greater fierceneſs: In the mean time his Pulſe was ſmall, and weak, that when it was conſulted upon, for the letting him blood again, 'twas thought dangerous, leſt his dejected ſtrength would not admit of ſuch a remedy: wherefore, Phlebotomie was performed only, in a very ſmall quantity, and a fomentation, and a Cataplaſme was preſcribed to be diligently applyed to his ſide; beſides twenty drops of the ſpirit of Harts-horn, to be taken in a ſpoonful of Cordial Julep, and the ſame to be repeated continually, within the ſpace of ſix hours: He ſweat that night very much, and the pain much remitted, his ſpitting was but little, interſperſed with Blood, which, within a day wholly ceaſed, and the pain alſo leiſurely vaniſhed. The ſick man took twice a day, a ſcruple of the ſame ſpirit of Harts-horn, and within a few days, he grew perfectly well, without relapſing.

This Feaver was a ſimple Synochus, ſtir'd up from the evident cauſe, *viz.* a Conſtriction of the pores: as ſoon as the Blood began to be ſomwhat filled with aduſt recrements, and ſo to ſwell up more, the matter, which ſhould have been ſeparated, by reaſon of its peculiar evil, was transferred into the Pleura, and being there fixed, compelled the Blood coming to it, to be coagulated, and therefore to be ſtopped in its circulation, and (when it could not be received by the veins) preſently to be extravaſated: from hence hapned the acute pain in the ſide, and bloody ſpittle, by and by, after the beginning of this Diſeaſe; then afterwards, the ſame matter being thruſt out of that neſt, which it had got, and being ſupped up again into the maſs of Blood, was fixed in the head; and there inducing the like ſtagnation of the Blood, and (as it is probable) coagulation, cauſed the vertigo, and cruel pain; which nevertheleſs was quickly cured, by the hemorrhage being ariſen, by reaſon of the extravaſated Blood. A part of the morbific matter, being after this manner drawn away, the other part

reſumed

reſumed by the Blood, was again conveyed to its uſual neſt, to wit, the ſide before diſtempered; where depoſiting its latex, (to wit, a portion of the Blood) it did coagulate it again, and compelled it to be extravaſated or to flow out of the veſſels: For that pain being renewed on the fourth day, with the bloody ſpittle, from the ebullition of the Blood, too extreamly, and therefore flowing out of the veſſels, would not be brought away; becauſe at that time, the Pulſe was ſmall and weak, with a falling down of the veſſels, that indeed the Blood was thought to have been run all out of the veſſels, for that being coagulated by the morbific matter, (and therefore tho expulſed the Arteries, yet not being able to be carried back by the veins) it was ſtopped in its circulation. Upon this, an acute pain followed, becauſe the Blood being heaped together by its frequent approach, and elevated into a Tumor, made a diſſolution of the union; alſo, by and by from the beginning, a bloody ſpittle came upon it, becauſe the Blood being reſtrained within, in the Body, ſomwhere in its motion, by reaſon of the moſt tender, and eaſily opening little mouths of the veſſels, ran forth into the Cavities; when to the ſame outwardly extravaſated, by reaſon of a more thick skin, and the mouths of the little veſſels being locked up, no way lay open, unleſs by its being made and ripened into an Impoſthume. The opening of a vein profited in the beginning of the Pleuriſie, becauſe it reſtrained the Blood, ſomwhere hindred in its circuit, from too great effervency; but eſpecially, for that, when the veſſels were by that means greatly emptied, they did again receive, and render fluent, whatſoever humors were before exterminated, and alſo the Blood beginning to ſtagnate in the diſtempered part. Alſo, the remedies helping moſt, about the beginning of this Diſeaſe, were of that ſort, which hinder the coagulation of the Blood, or diſſolve it in the coagulating; ſuch they are, which abound very much with a volatile, or an alchaliſate Salt: to wit, ſpirit of Soot, of Blood, Harts-horn, alſo ſpirit and ſalt of Urine, the pouder of the claws and eyes of Crabs, of a Boars tooth, or the Jaw of a Pike, are of known uſe. Among the common people, it is a cuſtom to drink an infuſion of Horſe dung; which medicine indeed, I have known often to have brought help, in deplorable caſes. In the mean time, all acid things whatſoever, becauſe they more coagulate the Blood, and hinder expectoration, are highly hurtful in this Diſeaſe.

Chap. XII.

Of a malignant or peſtilential Feaver in general.

Beſides the continual Feaver, which is already deſcribed, and which ariſes from ſome principle of the Blood being too much carried forth, there is another ſpecies of this, which is ſtirred up, by reaſon of the Blood being touched with ſome invenomed Infection, and therefore liable to enter into various coagulations, and corruptions: In which, not only the Spirit and the Sulphur, as in a Putrid Feaver, rage, and compel the Blood to grow immoderately hot, but beſides, the mixture of the Blood is preſently diſſolved, and its liquor goes into parts; and ſo moſt horrid Symptoms, with manifeſt danger of life, are induced in this ſort of diſtemper. Under this rank, we comprehend malignant, and peſtilential Feavers, the Plague, ſmall-Pox, and Meaſles: of which we ſhall ſpeak preſently.

Peſtilential Diſeaſes, wander ſo in the dark, and have an unknown original, that their cauſes, and beings are ſeldom explicated, without having a recourſe to occult qualities. By the unanimous conſent of all, the ſtrength, and power of theſe are placed in an invenomed matter; becauſe we perceive, from a peſtilent diſtemper, ſtrength ſuddenly to be overthrown, and life quickly deſtroyed, no otherwiſe than from the drinking of Poyſon. And therefore, for the explicating the nature of the peſtilence, it will not be beſides the matter, firſt, to inquire concerning Poyſon in general, and by what means it diſtempers our Bodies, then to ſhew what ſort of Poyſon is ſprinkled in the Plague, and contagious Diſeaſes: which being performed, we will treat particularly of the Diſeaſes but now recited.

Every thing deſerves the name of Poyſon, which ſtriking into our Body, after an occult manner vehemently hurts the temper, and actions of any part, or of the whole, profligates the Spirits, or perverts their motions, ſolves the mixtures of the Liquors, and

and induces Coagulations and Corruptions, deſtroys the functions and ferments of the Viſcera, and ſo ſuddenly and hiddenly brings life into danger. of theſe, which after this manner lie in wait for us, there is a mighty plenty, and very rich proviſion in the nature of things: oftentimes they are inly begotten within our body; outwardly they are abundantly ſupplyed from every Coaſt, and out of every tract of Earth, water and air, theſe daily ariſe out of the diſtinct families of minerals, vegetables, and Animals, and ſo mingle themſelves with our food, yea with our medicine, that we may complain with Plinie, *quod non ſit fateri, an rerum natura largius mala, an remedia genuerit.* That it was not known, whether Nature had begot greater Evils, or Remedies.

As there is great varieties of Poyſons, ſo, as to their Subjects, and ways of hurting, there is no leſs diverſity of them: for the moſt Poyſons, in their whole ſubſtance are ſaid to be contrary to us, that whatſoever they come to, with a burning force, and like fierce fire, they reduce into aſhes, yet out of theſe, ſome being noted for a peculiar raiſing of hurt, do more endammage one part or ſubſtance than another. The ſubjects, on which the taint of Poyſon, is next and more immediatly inflicted, are twofold; to wit, the animal Spirits, or the ſpirituous ſubtil Liquor flowing in the Brain, and nervous ſtock; and the Blood flowing in the Veſſels, and heart, when the object is carried only to one, or being improportionate, at one to either, that from thence, the diſpoſition of the Liquors, or of the containing parts, is overthrown, whereby the neceſſary functions, for the performing of life and ſenſe, are reſtrained, and this done latently, and as it were unforeſeen, theſe kind of diſtempers, we aſcribe to Poyſon.

The nervous bodies, with the animal Spirit, are not invaded wholly after the ſame manner, by every ſort of Poyſons; for they are tormented, now with a Stupor, now with Convulſions, and thoſe of divers kinds, and manners: The bile of a Tarantula cauſes dancing: A power ſent from the Torpedo, by the Angle, or lines of the Net, ſtupifies the hand of the Fiſher. The roots of the wild Parſnip, or the ſeeds of Lolium or Darnel, being eaten, make men mad: Opium, Mandrakes, Henbane, and the like, cauſe deep, and ſomtimes deadly ſleep. Theſe and many others, chiefly impreſs their Poyſon, on the ſpirituous or animal faculty, without any great perturbation of the Blood, or hurt brought to the heart.

There are alſo ſome Poyſons, which moſt of all inſinuate their malignity, to the maſs of Blood; wherefore, from ſome Medicines, there have been produced, a yellow or black Jaundice, ſomtimes a Leproſie, or leprous diſtempers, and ſwellings of the whole body, vapours breaking forth from ſecret hollows of the Earth, alſo from Coals newly inkindled, often ſuffocating the vital Spirits, at once congeal the Blood, and ſtop it in its motion, whereby the flame of life in the heart, could not be continued. How much corruption of the maſs of Blood is imparted from the peſtilent Infection, is perſpicuous to every one, from the ſpots and Whelks, which are as it were the marks of the blaſted Blood.

If the hurt, being firſt inflicted to either, *viz.* The regiment of the Heart, or Brain, be more lightly made, it is for the moſt part cured, without any great offence to either; wherefore, Convulſive motions, Stupifaction, Lethargie, Melancholy, Paralytick diſtempers, do not ſeldom begin with a laudable Pulſe, and without an immoderate effervescency of the Blood; and then, if the diſtemper does not get ſtrength, leiſurely end, and ceaſe. There are other Poyſons, which often deprave the Blood, and by diſſolving its mixture, corrupt it, in the mean time the animal functions remain whole enough. But if the ferment of the Poyſon be ſtronger, and hath more deeply fixed its roots, preſently the Poyſon is diſperſed, from one Province to the other: for when the nervous parts ſwell up, with a virulent juice, a portion of the Poyſon, is carried with the nervous Latex returning through the Lymphatick Veſſels, into the veins, eaſily into the boſom of the Blood, and infects its maſs, with the evil with which it was big: alſo, from the Blood being grievouſly impoyſoned, the juice, by which the nerves are watered, quickly contract the infection; hence mad men are in a Feaver, and thoſe taken with a peſtilent Feaver, are moſt often tormented with a Delirium, or Phrenſie. Concerning theſe things, we muſt conſider, what the alteration is, or the impreſſion of hurt, which is inflicted from the Poyſon, to the animal Spirit, with the brain and nervous appendex; and what alſo, to the Blood, with the Heart and the annexed Veſſels: tho here, it is not in the power of humane skill or wit, plainly to ſhew, or as it were point out with the finger the manner of its being done; yet we may be able to attain to ſome little knowledge of this thing, by reaſoning, and by comparing it, with other diſtempers.

Concerning the former, we ſhall obſerve, that the ſubtil Liquor, or animal Spirits, where-

wherewith the Nervous Bodies are blown up, and by whoſe expanſion, ſenſe and motion perform their reciprocal actions, are eaſily perverted from their tenſity, and equal expanſion: for as the Nerves are of a ſoft texture, and the Spirits which abound in them of a very ſubtil ſubſtance, they cannot endure any ſtrong or vehement objects; wherefore when any violent or improportionate thing falls on them, they are often compelled from their expanſion, and excurſion into flight, and a running backward, and not ſeldom into irregularities of motions: wherefore ſudden paſſions of the mind diſtract them, and drive them into Spaſms, and Convulſions; when the Alible Juice, by which they are repaired, is ſupplyed too ſharp, ſour or auſtere, they ſuffer now Palſies, and now contractures: If that ſome object more incongruous, (ſuch as we have affirmed Poyſon to be) ſhould be offered, whoſe Particles are indued with ſuch fierceneſs, or are of ſuch a kind of configuration, that when they grow impetuouſly hot with the Nervous Liquor, they ſhake or loſe here and there its more ſubtil or ſpirituous part, or wholly drive it away, and fix the remaining Liquor either with a ſtyptic force, or by ebullition, force it into inordinate motions; hence of neceſſity, evil diſtempers of the Brain, and Nervous parts ariſe, *viz.* ſomtimes a Convulſion, Trembling, Shivering, ſomtimes looſnings, or a ſtupefaction, and other ſymptoms of more grievous note. What things after this manner infect the Nervous Juice with Poyſon, are now more thick, and only when they are applyed in a very Corporeal ſubſtance, do inflict their hurt; now they are thin, and being reſolved, even into a vapour or breath, pour forth from a certain little prick, the ferment of Poyſon, through the whole Nervous ſtock. Somtimes the Poyſon of ſome hurtful thing, being eaten, firſt begins its Tragedy in the Ventricle; more often by a naked touch, leaves on the ſuperficies of the Body, a virulent taint, which eaſily and quickly with its ferment, contaminates the Spirits, diſperſed through the whole. The Infection, wherever inflicted, either within or without, is more largely diſperſed from the extremities of the Nerves, by their eaſie paſſage, being from thence brought into conſent of the evil, by the very many little ſhoots of the ſame branch. Often a more light touch of an invenomed thing, by the finger, or extremity of any other member, preſently communicates to the Brain, the received infection, and from thence it is retorted into the whole Body, and the fartheſt members; the reaſon of this is, that both the Particles of the Nervous Juice, and of the ſame invenomed infection, are ſo light, and ready for motion, that they paſs through moſt ſwiftly, as the Rays of light through a Diaphanous medium, the whole maſs of one another.

2. As often as the Blood contracts hurt from ſome Poyſonous thing, the Poyſon is fixed within; either ſlow, and of leſſer activity, which does not preſently betray it ſelf, nor break forth into cruel ſymptoms, till of a long time after, it is ripened by a ſilent fermentation, and hath firſt infected the whole maſs of Blood, as may be obſerved in ſome Poyſons, which are ſaid to kill at a diſtance, and not till after ſome months, or years. Or the Poyſons inſpired into the Blood, are imbued with a much more acute ſting, that from their Contagion, the Infection contracted, preſently breaks forth into cruel ſymptoms, and thereupon follows now a Feaveriſh effervency with Vomiting, Thirſt, and burning of the Precordia, now a ſwelling up of the whole Body, a diſcoloration of the ſkin, oftentimes a breaking forth of whelks, and buboes, and frequently alſo a ſudden loſs of all ſtrength, ſo that ſudden death, without tumult, and almoſt inſenſibly ſteals upon one: where by the way it is to be noted, If the Spirits of the Blood, provoked by the enemy, are able to encounter him, and to ſtrive for the victory, this Feaveriſh ebullition of the Blood is ſtirred up from the conflict; but if the Particles of the Poyſon, being far ſtronger, ſuddenly profligate the Spirits of the Blood, and extinguiſh life, preſently the Bloody maſs is corrupted, neither can it be circulated in the Veſſels, nor rightly inkindled in the heart.

If it be yet demanded, what mutations, the Blood infected with Poyſon, undergoes, either in its ſubſtance, or conſiſtency, that, for that reaſon it is rendered unfit for the ſuſtaining of Life? I anſwer after this manner; ſome Poyſons fuſe the Blood, and too much precipitate its ſeroſity, ſuch are Medicines, which by a ſtrong killing Purging, or by a *Profluvium* of Urine, or a diſcoloration, or ſwelling up of the whole Body, or with an eruption of Puſtules, cauſe a very great ſecretion of the ſerous Latex; in the mean time a great ebullition of the maſs of Blood is induced, whereby the Vital Spirits are greatly deſtroyed, the Particles of Salt and Sulphur too much exalted, by the Concoction, and are often ſo roaſted, that a Yellow or Black Jaundies is cauſed.

There are Poyſons of another kind, far more dangerous, which congeal the Blood, and by deſtroying its mixture, corrupt it, *viz.* the firſt induce a congelation to the Bloody maſs, and then a Putrefaction: for when the Spirits of the Blood, being over-

thrown, by the contagion of the Poyſon, are diſſipated, the equal mixture of the Liquor is looſned; wherefore the more thick Particles mutually infold one another, and (like Milk when Rennet is put to it, or growing ſowr of it ſelf) are coagulated apart: hence the Blood curdles in the Veſſels, that it is leſs readily circulated in them: coagulated portions of this, being inwardly diluted, into the boſom of the Heart, are apt to ſtagnate there, and ſo to bring forth frequent ſyncopes, and ſwounings: being carried outwardly, and in the circulating, fixed in the skin, ſomtimes being more plentifully heaped together, they induce a ſuffuſion of blackneſs through the whole, ſomtimes being more ſparingly diſperſed, they cauſe only ſpots, or Purple marks, like black and blew ſtroaks, and other appearances of malignity. But the coagulation of the Blood, quickly diſpoſes it to putrefaction or corruption; as is ſeen in extravaſated Blood, which is wont to grow ſoon black and putrid. For the Spirit being exhaled, the Particles of Sulphur and Salt remaining in the Blood, begin to go apart one from another, and to break the bond of the mixture, from whence follows Putrefaction.

Theſe things being thus premiſed of Poyſon in general, the reaſon of the method requires that we enter upon the handling of Feavers, which draw their Original, altogether from a malignant, and invenomed infection: and as under this title, the Peſt or Plague eaſily obtains the chief place, I will begin with its conſideration, and afterwards, I will ſpeak of malignant Feavers, Small-pox, and Meaſels, in order. But yet, before I ſhall propoſe its definition, I will briefly inquire, of the peſtiferous Poyſon, what its diſpoſition and Nature may be; alſo, from whence it may be born, and laſtly, by what means it is propagated into others, by contagion.

For the expreſſing the Nature of the Plague, Authors are wont to chooſe ſome invenomed Bodies, and from their names to frame an Elogy of this moſt wicked Diſeaſe; wherefore in the definition of the peſt, are commonly recounted the Nepelline, Aconital, and Arſenical Poyſon: the Lethiferous force of which however, as it conſiſts in a very thick matter, and does not exert or put forth itſelf but by a Corporal contact, doth not truly imitate the eſſence of the Peſtilential Diſeaſe: for this is founded in a Spiritual and Vaporous infection, by which its *Effluvia* being every way diffuſed, ſo potently unfold themſelves, that out of the beſt ſeminary or ſeed plot, they quickly propagate a fruitful Crop of death and deſtruction, By reaſon of its notable activity, this infection may deſerve to be called, as it were a certain quinteſſence of Poyſon; the very agil and ſubtil Particles of this, do penetrate all Bodies, and inſpire them with its ferment: for either being diſperſed through the Air, or hid in a certain tender or cheriſhing neſt, tho they ſtrike againſt the human Body but lightly, and as it were through a Caſement, they eaſily ſubdue it; for both the Animal Spirits, and thoſe of the blood, they quickly infect, and by that means, ſhortly pour forth the Venomous taint, into all the members.

When a Peſtilential Breath or Vapour, hath invaded any one, and that Poyſon hath firſt laid hold on the Animal Spirits, or thoſe of the Blood, or both of them at once, (as hath been already ſaid of Poyſons) the taint is quickly derived from the ſubtil and more thin ſubſtance of theſe, into a more thick matter: becauſe it quickly ferments the whole maſ of Blood, or of the Nervous Juice, and the excrementitious humors, every where abounding, and from thence is deduced into the ſolid parts, and fixes the evil in them. If this Diſeaſe, firſt poſſeſſes the Animal Spirits, preſently the hurt is communicated to the Brain, and the Nervous ſtock, and eſpecially to the Ventricle, forthwith it impoyſons the humour growing in theſe; looſens its mixture, perverts the regular motion, and renderr it wholly incongruous, and infeſtous to the more tender ſubſtance of the containing parts: by and by from thence, Cramps and Convulſive motions, cruel Vomitings, pains of the Heart, alſo Phrenſies, deliriums, or pertinacious watchings, are ſtirred up, about the firſt aſſault of the Diſeaſe: when in the mean time, the infection not being yet diſperſed through the Blood, the ſick are not Feaveriſh, nor are troubled with inordinate Pulſe, or Syncope, or appearances of marks; which ſymptoms however ariſe afterwards, as ſoon as the Blood is infected. If when the Spirits of the Blood are firſt poſſeſſed, with the impoyſoned infection, either drawn in with the Air, or attracted through the pores, its ferment is preſently diſſipated through the whole maſs of the Blood, the infeſted portions immediately begin to be looſned from their equal mixture, to go into parts, and to be coagulated, and the ſame, being delated, into the boſom of the Heart, are wont there to ſtagnate, and ſo to induce a Syncopy, Swoonings, and often ſudden Death; alſo being carried outwardly, fixed about the skin, to cauſe Buboes, inflamed riſings, and other marks of Poyſon; in the mean time, the ſick appear well in mind, nor are they troubled with Delirium

nor

nor Convulſive motions. If that from a more ſtrong cauſe, the hurt is inflicted to both parts at once, the courſe of the Diſeaſe is performed with a more horrid proviſion of ſymptoms, and eſpecially with a Syncopy, and Phrenſie at once infeſting.

As to what appertains to its riſe; when the Plague firſt ariſes in any Region or Country, there is attributed a twofold cauſe of it, *viz.* Primary or Metaphyſical, alſo Secondary or Natural, ſubordinate to that: The very Heathens did acknowledg this Diſeaſe, wherever it raged, ſent firſt of all from God, for the caſtigation of the wickednesſes of men, and therefore for its extirpation, they equally made uſe of Prayers and Sacrifices as of Medicines. As to what belongs to the Natutal cauſe, there are divers opinions. Some will, that the Peſtilence newly ariſen, be derived from the Heavens, and influences of the Stars only: on the contrary, others have affirmed it only to ariſe from the internal putrefaction of the humors of our Body: but theſe endeavour to deduce the cauſe of this ſickneſs too far off, and theſe more near than it ought: We will walk in the middle way, and what Reaſon perſuades, and what very many Authors aſſert, we will place the chief and firſt ſeminary or ſeed plot of this Poyſon, in the Air; becauſe, it ſeems conſonant to Reaſon, that from the ſame Fountain, from which the common food of life is had, the beginnings of death, no leſs diffuſive, are to be ſought. There is the ſame neceſſity for our breathing in the Air, as of Fiſhes living in the Water; wherefore, as to waters infected by Poyſon, the murrain of Fiſhes dying in heaps is aſcribed; ſo men dying of an Epidemical ſlaughter, without any manifeſt cauſe, nothing could kill, beſides the infection of the commonly inſpired Air.

For the Air, which we neceſſarily draw in for the continuance of Life, conſiſts of an heap of vapors and fumes, which are perpetually breathed forth from the Earth; in which the exhalations of Salt and Sulphur, being mingled with the atomical vaporous little Bodies, conſtitute here as it were a thick cloud: the motions of theſe are ſwift and unquiet, they are of a manifold figure, and very much diverſe, wherefore ſome continually meet againſt others, and according to their various configurations, they cohere with theſe, aud are mutually combined one with another, and from thoſe they are driven, and fly away: from hence the reaſons of the Sympathy and Antipathy of every thing, depend. From the diverſe agitations of theſe kind of Atoms, near the ſuperficies of the Earth, this or that tract of the Air, enters into diverſe alterations, by which, Bodies, chiefly the living are variouſly affected: becauſe the inteſtine motion, of the Particles of every Animal, depends very much upon the motion and temper of the Particles of the Air: foraſmuch as theſe perpetually exagitate thoſe, raiſe up thoſe lying aſleep, repair the loſs of thoſe flying away, ſhake the vital flame with their Nitroſity, and ſupply it with a Nitrous-Sulphureous Food, eventilates it being inkindled by continual turns of acceſs and receſs, and carry away the Soot and Fumes. So long as an apt contemperation happens in either, for motion and configuration, living Creatures injoy perfect health and life; but if the little Bodies ſwiming in the Air, be of that ſort of figure and power, that are plainly adverſe to the Spirits implanted in living Creatures, they looſe the mixtures of theſe, from the reſt, from whoſe Elements they are collected, and pervert their motions; hence the diſpoſitions of things are deſtroyed, life profligated, and, the ſame being ſcarce extinct, the Bodies undergoe putrefaction; hence the tops of Trees, or of Corn, being ſtruck with a blaſt, ſuddenly grow dry or wither; hence among Cattel, the murrain often rages, which kills at once whole Flocks; by reaſon of this kind of cauſe, the Seeds of the Peſtilence firſt put themſelves forth, and attempt the ſlaughter of human kind: for as invenomed Bodies in the bowels of the Earth or concreted on its ſuperficies, produce the Arſenical or Aconital mixtures, ſo theſe being even reſolved into vapour, and heaped together in the Air, create moſt pernitious Airs, from which Malignant and Peſtilential Diſeaſes ariſe; the infection, which after this manner Contammates the Air, the moſt ingenious *Diemerbrochius*, a ſearcher of this Diſeaſe, contends, that is only ſent (as the wrath of angry *Apollo*) immediately from the angry right hand of God: but this were to multiply without any pretext of neceſſity (I will not ſay beings but) miracles, and in every Plague to aſſert a Creation of new ſubſtance; when in the mean time, the virulent product of Minerals and Vegitable, which dayly appear, and of as quite adverſe Nature to us, as the Plague, clearly teſtifie, that there lives hid in the Bowels of the Earth, plenty of invenomed matter, ſufficiently fitted for this buſineſs. For the little Bodys, which being roled about with earthy matter, do conſtitute the Poyſonous mixtures in the boſom of the Earth, the ſame being reſolved into vapours, will be no leſs hurtful afterwards, and impreſs a peſtiferous blaſt to the Air, which they wander through: wherefore, by the leave

of ſo Learned a man, I ſhould ſay, that it ſeems not improbable, that the things which firſt of all affix the ſeed plot of the Peſtilence, to any tract of Air, be the Poyſonous *Effluvia* of fierce Salts and Sulphurs, and (by the Divine Will inſtigating) breathing forth from the bowels of the Earth; which ſomtimes, being a long time before ſhut up, are leiſurely exhaled out of Dens and Caverns; ſomtimes by reaſon of the motion of the Earth, or Earthquake, or a gaping of the Earth, they break forth in heaps; alſo, of the ſame kind, are thoſe which ordinarily are breathed forth from the filth of Souldiers in their naſty Camps; or from unburied Carcaſes; or from places, beſet with ſtanding and ſtinking Mud: but the little Bodies after this manner exhaled, obtain their wonderful height, properties, and abilities, by a long putrefaction, that therefore they are incongruous, and heterogeneous to all others whatſoever, and ſo being received into the Air, ferment it (as it were a maſs of Liquor) and pervert it from a wholſom and benign, into a moſt pernicious and wicked Nature.

Some Bodies more eaſily, others not ſo readily receive the malignant tincture of the Peſtilent Air. Thoſe who by reaſon of ill feeding are full of evil humors, and who by reaſon of fulneſs, have their Blood ſtuffed with firable Sulphur, receive the Peſtilential Poyſon, by the left blaſt of the invenomed Air, eſpecially if fear or ſadneſs happen, which convey inwardly, and lead to the Heart, as it were by a certain attraction the moſt light darts of the contagion. On the contrary, thoſe who have their Viſcera clean, and the maſs of Blood well tempered, and are indued with a ſtrong, and fearleſs mind, do not ſo eaſily receive this infection, and ſomtimes exterminate it ſoon, being received.

Thus much for the beginning and divulgation of the Peſtilence, according to its firſt Fountains, and from thence the ſtream of the infected Air being deduced: it remains for us to ſpeak concerning its propagation by contagion, foraſmuch as it is derived, as it were extraduce from ſome and ſo to others.

We underſtand by Contagion, that force or action, by which any diſtemper reſiding in one Body, excites its like in another. But as this may happen, either immediately by contact, as when any one lying in the ſame bed with another, taken with the Plague, or mediately, and at a diſtance, as when it happens that the infection is tranſferred from one houſe to others remote, or alſo if the Plague come upon any one, after many days or months, perhaps years handling a Garment, or houſe-hold ſtuff, brought from an infected houſe: therefore that the Nature of the Contagion, and its diverſe modes may be plainly made known, we will firſt weigh what that is, which ſtreams from an infected Body. Secondly, how it bears it ſelf through the Medium of its paſſage. Thirdly, by what means it begets a diſtemper like it ſelf, in another Body.

1. That from every Body, altho of a more fixt Nature, *Effluvia* of Atoms conſtantly fly away, and run forth, which round about conſtitute as it were a Cloud or Halos, and as it were cloath it, like the down of a Peach, is ſo much received among the more ſound Philoſophers, that nothing can be more. But by how much the more any thing conſiſts of active Particles, by ſo much the more, it ſends from it ſelf, little Bodies of more remarkable virtue and energy. Hence the *Effluvia* which fall from Ambers, are able to move other Bodies from their place: emanations proceed from Sulphureous things, which fill the whole neighbourhood with odors. And ſo when the Peſtilential venom, as hath been already ſaid, is from hence any where fixed, and tho in the ſmalleſt bulk, is of great efficacy and operation, there is a neceſſity, that ſome emanations, proceed from the Bodies imbued with it, which refer the nature or diſpoſition of the ſame Poyſon and malignity, and diffuſe them on every ſide according to its ſphear of activity. But when theſe little Bodies, which retain the contagion of the Peſtilence, as they ſtream from one Body, are not preſently received by another, we ſhall inquire, how they carry themſelves, in reſpect of their paſſage, through the medium.

Where we ſhall preſently meet with a difference in thoſe, from many others, for that the *Effluvia*, which ordinarily evaporate, do not long retain the Nature or Diſpoſition of the Body, from which they flow, but either vaniſh into Air, or being impacted to other Bodies, are aſſimilated to them: but thoſe Particles, which fall from a Peſtilential Infection, are not eaſily ſupped up by the Air, or any other Body, ſo as they may be wholly deſtroyed; but among the various confuſions of Atoms, and the daſhings of other Bodies, they keep themſelves untouched, For this untamed Poyſon remains ſtill the ſame almoſt, and not to be overcome by others, and tho it conſiſts of never ſo little heap of Atoms, will not preſently vaniſh; but with its ferment, imbues the next little Bodies, and ſo acquires new forces, and gains ſtrength by going; from whence it lurks a long while in ſome neſt, and after a long time, when it aſſaults

a convenient ſubject, puts forth itſelf, and imparting the taint of its Poyſon to another, raiſes up again the Diſeaſe of the Peſtilence anew, which ſeemed before to be exploded, and tho from the ſmalleſt ſeminary, ſprinkles far and near its deadly Poyſon.

For the Peſt, brings forth ſuch moſt ſure ſigns of its contagion, that ſome Authors contend, that for this reaſon it only continues among Mortals, and doth never ſpring up anew, but is only conſerved from its neſt, and carried from thence, from one Region to another. Hiſtories relate, that the ſeeds of this have lain aſleep for ſeveral years, in ſome Garment or Bedcloaths, and that afterwards, they being ſtirred, it hath appeared, and hath ſtirred up anew the Diſeaſe of the Peſtilence, increaſing with a mighty ſlaughter of men. When by reaſon of the tinder, or cheriſhing neſt, the Plague is propagated after this manner, at a diſtance, the invenomed little Bodies, which remain in the infection, being moved, preſently leap out, and unfold its Poyſon every way, as it were by a certain irradiation: if that they ſtrike againſt an human body, preſently they lay hold on the Spirits, and are by their Vehicle conveyed inwardly, and then by an eaſie labour, they infect the Blood and Humors, whereſoever flowing in the Veſſels, with their ferment, and quickly bring to them coagulations and putrefaction. And after this manner, through the moſt ſubtil *Effluvia*, is made as it were a certain tranſmigration of the Peſtilential Diſeaſe, even as when a ſhoot being cut off from ſome Tree, and laid up for a time, and afterwards ingrafted to another Trunk, tho from the ſmalleſt bud, it is able to produce a Tree of the ſame Kind and Nature.

Chap. XIII.

Of the Plague.

THus far we have diſcourſed of Poyſon in general, alſo of the Peſtilence, its beginning and propagation by contagion: it now remains, that we explicate the deſcription of the Plague, its Nature, according to its accidents, and ſymptoms, moſt worthy of note; then ſome things ſhall be added, which belong to its Cure.

The Plague may be deſcribed after this manner, that it is an Epidemical Diſeaſe, Contagious, highly infeſtous to human kind; taking its beginning from an invenomed Infection, received firſt by the Air, and then propagated by Contagion; which having hiddenly aud largely ſet upon men, cauſes extinctious of the Spirits, coagulations of the Blood, blaſtings, mortifications or deadneſſes of the ſolid parts, and with the appearances of whelks, buboes, or carbuncles, as alſo with the horrid proviſion of other ſymptoms, brings the ſick in danger of life.

Altho the Plague be one kind of Diſeaſe, and its ſpecifical differences, or eſſential are not found, yet by reaſon of the divers kinds of accidents, which come upon it, ſome diverſities and irregularities of it are obſerved, which ſomthing vary the type of the Diſeaſe, tho they change not the ſpecies. For firſt this diſtemper ſomtimes is more univerſal that it rages every where through many Vilages and Cities at once; but ſomtimes it is circumſcribed in narrower bounds, and only threatens one Region or Tract of Land. Secondly, ſomtimes the Plague comes ſimple, and unmixt with other Diſeaſes, wherefore privily, and as it were by ſurpriſe, almoſt without a Feaver, or vehemency of ſymptoms, brings a ſecret killing of the ſick. Somtimes it is complicated, with a number of other Diſeaſes, that the buſineſs is carried with tumult and frequent skirmiſhing between Nature and Death. Thirdly, the degree of malignity conſtitutes a great difference; for the Plague in ſome places, and times is much more mild, that many of the ſick eſcape; ſomtimes it is highly mortal, that moſt taken are killed, and that ſcarce one of an hundred recovers.

But becauſe this Diſeaſe hides its weapons, and coming on men unawares, kills them ſuddenly, therefore it ſhall be our work, that by ſome ſigns, as it were watchmen planted, we may know the Clandeſtine coming of this enemy, altho we are not able to foreſee it from afar. Very many ſigns happen, which foretel ſhortly a Plague about to come: to wit, if the year keeps not its Temper, but has immoderate, and very unſeaſonable exceſſes, either of heat or cold, or of dryneſs or wet; if the

ſmall

ſmall-pox or Meaſles, do every where rage; if Boils or Buboes, accompany reigning Feavers. Beſides, Aſtrologers are wont, from the Aſpects of the Stars, or appearances of Comets, to predict the approaching Plague, but this ought rather to be called a vain conjecture, than a certain foreknowledge. From a preceeding Famine, a moſt certain preſage may be taken, of a Plague to follow, as in the Adage-Μετὰ λιμὸν λοιμὸς. The Plague comes with the Famine. For the like Conſtitution of the year, which for the moſt part, by reaſon of the Corn being blaſted, brings ſcarcity, is apt alſo to produce the Plague: alſo, an evil way of feeding which people in dearths uſe, eating all unwholſom things, without choice, diſpoſes their Bodies, to the more eaſie receiving the Infection. Yea, alſo earth-quakes freſh openings of Caverns, and ſecret Vaults, by the gaping of the Ground, by reaſon of the eruptions of malignant and impoyſoned Airs, often give beginning to the Peſtilence. For indeed, as there is need of great diligence, to foreſee, as it were from a watch-Tower, the approaching Plague, ſo there is no leſs need of care and diligence, to conſider, or take notice of the ſame, being freſh riſen, and the ſhooting of its firſt darts: For oftentimes, being too ſolicitous, we dread vulgar Feavers, if perchance they end in death, for this Diſeaſe; and ſomtimes being too ſecure, contemning the Peſtilence, by reaſon of its Symptoms, like to a common Feaver, we apprehend not our danger, till too late; wherefore, for the more full knowledge of this Diſeaſe, we will ſubjoyn its Signs and Symptoms both common, and Pathognomic or peculiar, and briefly deſcribe their cauſes, means, and manner of being done.

Beſides the ſigns already delivered, which by a certain demonſtration *à priori* or before-hand, bring a ſuſpicion of the Plague about to come, there are others, the concourſe of which, plainly ſhew its preſence, in the ſick body: of theſe, ſome are common to the Plague, with a Putrid Feaver, ſome are more proper to this diſtemper. For the impreſſion of the Peſtilence, moſt often ſtirs up an effervency of the Blood, and ſo has frequently a Feaver joyned with it, that among ſome, in the definition of the Plague, it hath the place of a kind of Feaver; wherefore, by reaſon of the ebullition of the Blood, and the hurt brought to the Viſcera, preſently there follows, a growing hot, a ſpontaneous wearineſs, thirſt, a burning of the precordia, often great Vomitings, pains of the Heart, torments of the Inteſtines, a ſcurfineſs of the Tongue, or a blackneſs, a pain of the head, watchings, Phrenſie, palpitation of the Heart, ſwooning, and ſudden loſs of ſtrength: tho Feavers are moſt often beſet, with theſe kind of Symptoms, yet if at the ſame time, the Plague hath ſpread in the neighbourhood, and a fear of it hath poſſeſſed the minds of men, hence a greater ſuſpition of this evil is cauſed, eſpecially, becauſe, whilſt the Peſtilence reigns, other Diſeaſes in any one, leave their proper Nature, and change into it: wherefore, if there happens to the diſtempers but now recited, a Communication of the ſame ſickneſs to many, and a frequency of Burials, that it becomes every where very deadly, and ſpreads largely even by contagion; and if beſides, Buboes, Carbuncles, Spots, or other marks of the peſtiferous infection appear, the buſineſs is put without doubt, and we may with no leſs faith denounce it the Peſtilence, than when we ſee an houſe flaming, with fire breaking through the Raſtures, we cry out Fire. But becauſe here is mention made of Buboes, Carbuncles, and of other Symptoms, (of which we have already ſpoken, where we treated of Putrid Feavers) it remains, that we briefly touch the cauſes of them, and the manner of their being made: They are theſe: A Carbuncle, a Bubo, Whelks, Inflamations, and malignant Puſtles.

Concerning theſe in common, we ſay, that they are all produced of the Blood, and nervous juice, touched with the peſtiferous Poyſon, and coagulated in parts, in their circuit, and diſtempered variouſly with putrefaction; foraſmuch as the Spirits, reſiding in either Liquor, eſpecially in the Blood, are no ſooner profligated, by the blaſt of this malignant Diſeaſe, but a coagulation is induced to the remaining Liquor, even as milk growing ſour, or when ſome acid juice is poured to it; wherefore, portions of it being more grievouſly touched with the Poyſon, they ſoon curdle or grow into gobbets, and ſuffer corruption with blackneſs, like Blood out of the Veſſels; from whence, preſently they hinder the motion of the reſt of the Blood in the Veſſels, and in the Heart, and by means of its ferment, more coagulate it; but whatſoever by congelation grows into curdled gobbets, unleſs it be preſently caſt out of doors, cauſes death quickly, by reſtraining the circulation of the Blood; and being thruſt forth outwardly, towards the ſuperficies of the body, ir is ſtopped in its motion, between the narrow windings of the Veſſels; and being wholly deſtitute either of Spirit, or being ſtruck by a blaſting, produces its deadneſs, black and blew ſpots, and black or purple marks; or, by reaſon of the Salt and Sulphur, being exalted, by the peſtilential ferment, and affecting new things, grow together into tumors of a various kind.

A Carbuncle, or Fiery Inflamation, is a fiery Tumor, with moſt ſharp and burning Puſtules round about it, and infeſting the ſick, with an acute pain; which ariſing in various places ſeverally, will not be ripened, but creeping more abroad on the ſuperficies, burns the skin, and at length ſhakes off the lobes, or gobbets of its Corruption, and leaves an hollow ulcer, as if burnt by an Eſcharotick or burning Plaſter.

The generation of Plague-ſores, ſeem to be made after this manner, when Poyſonous infections do ſtrike into the Blood, in its own nature torrid, portions of it congealed, are fixed in the ſuperficies of the Body; and in that place, becauſe the motion of the Blood is a little hindred, a tumour at firſt ſmall, is induced; which afterwards, by a malignant ferment, unfolding it ſelf more largely, being leiſurely increaſed, creeps into the neighbouring part: A ſuppuration follows not, becauſe the matter being extravaſated, and ſtagnating, is not concocted and digeſted by a gentle heat, but by reaſon of the particles of the outrageous Sulphur, together with the carried forth Salt, being heaped up in theſe Tumors, and becauſe of the ſtagnation, they being preſently looſened from the mixture, a burning is excited, as if a Cautery were affixed to the part: pieces and lobes of skins, eaten as it were from a covered Eſchar, fall off, becauſe the Corroſive venom, impacted in the Muſcles, gnaws not only to the ſuperficies, but thoſe that lie tranſvers through the whole ſubſtance; wherefore, before all the fleſh is conſumed, with the membranes, in which the eaten pieces were invalved, ſome piece, as it were cut off from the reſt falls away. A Carbuncle, oftentimes but one, oftentimes more ariſe: ſomtimes they are alone, ſomtimes they are accompanied with a Bubo.

A peſtilent Bubo ſprings forth, only in glandulous places, into whoſe ſubſtance goes, not only the Blood congealed by the Poyſon, and carried through the Arteries, but the nervous juice heaped up there, and carried back into the Veins. Becauſe this Tumor happens from leſs torrid juices, and in part more frigid, therefore it partakes of ſuppuration. For the matter being leiſurely heaped together, when (by reaſon of the ſtagnation, the vital Spirit being departed) it had loſt the form of Blood, it was by a long concoction converted into matter, from the particles of Salt and Sulphur exalted, and reſtrained in the Tumor. But that theſe Tumors only happen in the Glandulas, the reaſon is, not that by the deſtination of Nature, the neſt or tinder of the Diſeaſe, is carried to theſe parts, but as the particles of the virulent infection, abound every where in the Blood, and nervous juice, they are more readily gathered together, as in a common Family, and where the Blood being dilated to the extream parts of the Arteries, and is ſo not readily received, and carried back by the veins, and alſo the alible juice, to be carried back from the nerves, into the veins, is depoſed: either of theſe, as it appears clearly, by late obſervations of Anatomiſts, and by experience, are made or done about the Glandulas; wherefore, when in theſe parts, either humors, being ſtuffed with the peſtilent ſeeds of the contagion, come together at once, as it were the neſt of the malignity, becauſe of the virulency here depoſed from either, is blown up.

Whelks, fiery inflamations, and purple ſpots, in reſpect of the venom, are of the ſame ſtuff, as the Tumors but now deſcribed: but in theſe, the product of the virulency, conſiſts in a leſſer ſubſtance, yet with greater danger, by reaſon of the ſeeds of the Poyſon, being more diſperſed: more ſmall portions of the coagulated Blood being fixed in the skin, conſtitute theſe leſſer appearances, wherefore, out of theſe, ſome being increaſed, are ripened into little itching bliſters: others, by reaſon of a certain blaſting, or deadneſs of the corrupted Blood, grow into black and blew, and purple Spots.

Altho the Plague, by reaſon of its ſudden, ſecret, and very ſwift aſſault upon ſick people, hardly gives time or place, for a prognoſtick, and when this Diſeaſe, by reaſon of the occult manner of hurting, contains in it ſelf nothing that is not ſuſpected, yet there are ſome ſigns, that appear in its courſe, by which we are wont to foretel, either Life or Death. The buſineſs is then deſperate, if the Diſeaſe paſs preſently into an Epidemical diſtemper, and makes violent aſſaults; if that bleeding, or only a ſmall ſweat follows, in the beginning of the Diſeaſe; if the Urine be thick and troubled, the Pulſe unequal, and weak; if a Convulſion, or a Phrenſie preſently follow; if the Vomits, or Stools are blewiſh, black, or highly ſtinking; if the Whelks at firſt contract a redneſs, afterwards a blewneſs; if the Carbuncles are many; if the Buboes at firſt ſwelling up, diſappear; if ſtrength be ſuddenly loſt, the face horrid, or grows black and blew; if with a ſhivering of the outward parts, there be an heat of the bowels, eſpecially if theſe, or many of them happen in a body full of ill humors, or in an unwholſom ſeaſon. On the contrary, the ſick may be bid to be of good chear, if the condition of the Peſtilence be lighter, and leſs deadly; if the Diſeaſe happens in

a robuſt and healthful body, with a ſtrong mind; if remedies may be timely had, before the Diſeaſe hath poſſeſſed the whole maſs of Blood. Alſo, if with a continuance of ſtrength, high and equal Pulſe, a ſuppuration of the Buboes, and a large profuſion of matter, with the abſence of more horrid Symptoms, the courſe of the Diſeaſe is performed: In the mean time, altho here we may hope all good, yet we are not to be ſecure, becauſe, ſomtimes the ſnares of life, are laid privily, with the laudable appearance of ſigns, and we ſuffer moſt grievouſly as from a reconciled Enemy, whoſe fierce threatnings we ſeemed to have ſhun'd.

Concerning the curing of very many ſickneſſes, the buſineſs is chiefly committed to Nature, to whoſe neceſſity, Phyſick is the Midwife: and the office, and ſcience of a Phyſician, chiefly is buſied in theſe, that occaſions of giving convenient aids, to this labouring, be attended, but the Plague hath this peculiar, that its cure is not at all to be left to Nature, but that it is to be endeavoured any way, by remedies gathered from Art. Nor are we to be ſolicitous of a more opportune, or as it were a gentler time, but Medicines are moſt quickly to be prepared, and we muſt not ſtay for them ſome hours, no nor minutes. But becauſe, whilſt the Peſtilence reigns, there is no leſs need of care, that the Contagion may be driven far away, than that the Diſeaſe being impreſſed may be cured, therefore, a double task is incumbent on the Phyſician, to wit, that he looks to the prevention of this malignant Diſeaſe, as well as to the cure. To preſcribe a method for both theſe, had been a work of too much tediouſneſs, and to have given you a diſh a thouſand times dreſſed by Authors, wherefore, we will only touch lightly here, ſome chief Indications, and haſt to other things.

Preventive cautions, either reſpect the Republique, and belong to the Magiſtrate, or private perſons, to whom it ſhould be taught, what is to be done by all men, when the Plague is feared.

The publique care in the time of the Plague, conſiſts chiefly in theſe, that Divine worſhip be truly obſerved, that all neſts of Putrefaction be cut off, that filths, Dunghils, and all ſtinking things may be removed out of the Streets, and all occaſion of the Contagion diligently avoided, and that an wholſom means of living be conſtantly obſerved by the Citizens. For which end, the uſe of fruits, and of other unwholſom things ſhould be interdicted: that poor people, who have not plenty or choice of food, ſhould be provided for, at the publique charge: If ſtill the Peſtilence begins to ſpread, the empoyſoned force of the Air ſhould be corrected, as much as may be, which may be beſt done, by the frequent burning of Sulphureous things; the infected ſhould be ſeparated from the ſound, and the dead Careaſes, and houſhold-ſtuff ſhould be avoided; and laſtly, that able and fit Phyſicians, and Miniſters be provided for the uſe of the ſound, and the neceſſities of the ſick.

The preventive means of a private perſon, is wont to be concluded in theſe three things, *viz.* Diet, Phyſick, and Chirurgery. Diet reſpects the ſix nonnatural things, among which, of the greateſt moment are, the Air and paſſions of the mind: as to the reſt, *Hippocrates* his precept may ſuffice, *viz.* Labour, Meat, Drink, Sleep, *Venus*, ſhould be taken moderately. The Peſtilent Air ſhould be avoided, by going into ſome other place; or corrected by the well burning of Sulphureous things, or whilſt we breath it ſhould be cured by fumigations and ſweet ſmells, often carried near the noſtrils. As to the paſſions of the minds, fear, and ſadneſs, whilſt the Peſtilence rages, are as it were another Plague; for in theſe, the ſeeds of the envenomed Contagion, which are placed in the ſuperficies of the Body, as it were on the edge of a whirlpool, are ſnatched inwardly, by a certain force, and carried to the Heart; wherefore, tis a moſt excellent Antidote, to be of a chearful and confident mind. I have known many, who (as *Helmont* was wont to ſay) by fortifying the Archeus, with Wine and confidence, never uſed any other Poyſon-reſiſting Medicines, and remained without any hurt of the Contagion among the infected: and on the contrary, ſome ſtruck with fear, when they have dwelt far from all Contagion, have drank in the ſeeds of the Peſtilence, as if they were derived from the Stars.

Among the Chirurgical things, to be adminiſtred for preſervation ſake, are wont to be commended, the opening of a Vein, Cauteries, and Amulets. Where there is a fulneſs, with a great ſwelling up of the Blood; or in thoſe who conſtantly, by long cuſtom are wont to be let Blood, it is convenient to open a Vein: For the leſs the Blood grows hot, and is circulated without Tumult, in the Veſſels, it will be ſo much the longer, ere it be contaminated, by the peſtiferous Diſeaſe. Iſſues made by Cauteries, are ſo much uſed, almoſt by the ſuffrage of all, for preſervation ſake againſt the Plague, that tis become the moſt common receipt: For theſe by a conſtant tranſmiſſion pour forth the aſſiduous coming of the ſuperfluous and excrementitious matter; and if

that

that the infections of the Peſtilence be admitted inwardly, they are caſt forth of doors, at theſe open ports.

Amulets, hung about the neck, or born on the wriſts, are believed to have a wonderful force againſt the Peſtilence; of theſe, among ſome, of the greateſt eſteem, are ſuch as are made out of Arſnick, quick-ſilver, the pouder of Toads, and other Poyſons. That the ſame in this caſe may be profitable, beſides the obſervations of Phyſicians this reaſon may ſeem to perſuade ſomthing. The *Effluvia*, or atomical little bodies, emerging now from theſe bodies, now reſiding upon theſe, are before affirmed to fly about through the whole Region of the Air; theſe, as they are diverſly figured, ſome of them eaſily cohere with others, but if they ſtrike againſt ſome of another form, they oppoſe and overturn them: hence, the particles of the peſtilent Infection, which are adverſe to our Spirits, excellently agree with thoſe little bodies of Poyſon placed near, and are readily fixed to them: wherefore, the Amulets made of Poyſon do this, *viz.* They receive the ſeeds of the Peſtilence meeting us, into themſelves, by reaſon of the likeneſs of parts; alſo, by alluring the ſame from our bodies, into their embraces, they in ſome meaſure, free the infected from the infection.

The Medicinal prevention hath a twofold ſcope: Firſt, that the aſſiduous coming of the excrementitious matter or humors be taken away by a gentle purging, as often as there is need: Secondly, that by the daily taking Poyſon-reſiſting Medicines, our Spirits, and Body may be fortified againſt the aſſault of the Poyſon: By the former, the Food and cheriſhers, of which encreaſe putrefaction brought in by the Poyſon are drawn away; by the latter, the firſt inkindling of the peſtiferous Infection, as it were a deadly fire, is inhibited. Alexipharmies or Medicines contrary to Poyſons ſeem to be helpful againſt the contagion of the Plague for this twofold Reaſon; Both becauſe the maſs of Blood and Viſcera being filled with the particles of theſe, and alſo the Spirits before poſſeſſed with the ſame, they do not eaſily admit of the company of the impoyſoned Infection; alſo, becauſe the Blood being incited by the gentle fury of theſe is kept from coagulation.

Thus much for preſervation, it follows now, that we ſpeak of the cure of the Plague. The doctrine of which, is either general, and comprehends remedies, which for this end, are taken from Diet, Chirurgery, and Medicine; or ſpecial, which delivers the uſe, and Cautions to be exhibited, about thoſe Remedies; and by what means we are to oppoſe the Symptoms variouſly ariſing.

Diet comprehends the uſe of the ſix non-naturals, but the chief care, and medical cautions, are to be given about eating, the primary Indications of this, conſiſt not at one and the ſame time together, but ought to be ſupplyed by turns, according to the nature of the thing, and the exigency of nature. In reſpect of the malignity, and of the loſs of ſtrength, Aliments are to be deſired, which greatly cheriſh the Spirits, and bring a more plentiful nouriſhment: in reſpect of the Feaveriſh diſtemper, a more ſlender refrigerating Diet, and temperating the Blood, ſeems to be required: The Phyſician muſt regard either, but he may rather intend his Remedies againſt the malignity, than the Feaver.

The helps that belong to Chirurgery, are the opening a Vein, which ſeldom and very cautiouſly ought to be uſed in this Diſeaſe, becauſe the Blood being too much exhauſted, and the Veſſels falling down, ſweat is not ſo eaſily procured; inſtead of this, it is better to uſe Cupping, with ſcarification. For this, and Bliſtering, are rightly applyed for the drawing forth of the Venom; moreover, againſt Buboes, Inflamations, or malignant Ulcers produced by them, Cataplaſms, Fomentations, Plaſters, Oyntments, and many other things, to be outwardly applyed, are to be ſought for from Chirurgery, in which ſome Poyſons, as the Electric of Poyſon, are preſcribed by ſome to be admixed; wherefore, preparations of Arſnick, to wit, the oil and balſom of it, are commended by many, in this caſe too of moſt excellent uſe and efficacy.

Medicines for the cure of the Plague, are either Evacuators, or Poyſon-reſiſters: The intention of the former is, that the ſerous Latex in the Blood, and the excrementitious humors, which abound in the Viſcera, be thruſt forth of doors; and together with them, very many particles of the invenomed Infection, every where diſperſed in the Body: But theſe are both Vomitories and Purgers, the uſe of which is more rare, and only in the beginning of the Diſeaſe, alſo Diaphoreticks or ſweating Medicines, which at ſome times may be ſuffered according as there is ſtrength, are to be preſcribed in the Plague: For theſe more fully, and from the whole body at once evacuate, yea, and by agitating the Blood, defend it from Congelation, and as they move from the Center, ſtill to the Circumference, they drive the empoyſoned ferment, alſo the Corruptions of the Blood and humors, far from the heart, and ſo chaſe the Enemy with-

out the Camp. But Vomits, and Purges evacuate leſs univerſally, and by Concentrating the malignant matter, oftentimes carry it inwardly, and fix it to the Bowels. But theſe Medicines, whether they operate by purging, or ſweating, ought to be of that kind, which have particles, rather agreeable to the empoyſoned infection, than to our Blood or Spirits; for ſuch a Medicine, will paſs through the various windings of our body, with its whole forces and unmixt, and by reaſon of the ſimilitude of either, more certainly takes hold of the virulent matter of the Diſeaſe, and carries it forth of doors with it ſelf, by the mutual adheſion of the parts, which way provoked nature leads. Wherefore, Medicines, whether Catharticks or Sudorificks, are commended before others, which are prepared out of Mercury, Antimony, Gold, Sulphur, Vitriol, Arſnick, and the like; which, when they cannot be ſubjugated by our heat, or maſtered, become the beſt Remedies againſt the Poyſon of a peſtilent Diſeaſe: for theſe do not only potently evacuate ſuperfluous things, but when as they put forth very ſtrong and untameable particles, and explicate them every where in the body, diſſipate the ferments of the Poyſon growing here and there, and hinder them from maturation; and as theſe Remedies, being of themſelves not to be overcôme by Nature, are neceſſitated to be carried outwardly through the open paſſages of the body, they carry forth of doors with them, whatſoever extraneous or hoſtile thing is met with.

As to Poyſon-reſiſting Medicines, or Alexiterians, which are ſaid to reſiſt the Poyſon of this Diſeaſe, without any ſenſible evacuation, they are (for the moſt part) ſuch, whoſe particles are not very much of kin to Nature, ſo as to goe into Aliment; nor ſo diverſe, as to provoke to an excretion. The ſame being inwardly taken, and broken into the ſmalleſt pieces, inſpire the Blood, and juices flowing together in the Veſſels, and Viſcera, with their little bodies, as with a new ferment, and by moving the ſame gently, and by keeping them in an equal mixture, defend them from Coagulation, and Putrefaction; diſſipate the particles begun to be heaped up, one from another, by the ſame gentle agitation, and hinder them from maturity; and laſtly by pre-poſſeſſing the Blood and Spirits, defend them from the impreſſions of the peſtilent mark. Among theſe, ſome more ſimple Remedies are commended as Rue, Scordium, *&c.* but moſt of all by far are eſteemed, thoſe that are compounded, wherefore, Treacle, Mithridate, and Diaſcordium, ſome of which are compos'd of no leſs than fifty ſimples; that, 'tis eſteemed a crime in Medicines ſo compleat in all numbers, to omit one Plant, or one Dram of them in their Compoſitions; the reaſon perchance is, becauſe very many things being put together, may make a maſs, whoſe diverſe kinds of particles being exalted, by long digeſtion, may ſtir up the greater fermentation in our Blood and humors.

Having after this manner ranked the Remedies, in which we ought to be inſtructed, for the curing of the Plague; now next we ſhould ſpeak of the method of cure, *viz.* What firſt, and then what next, ſhould be done in order: but that this Diſeaſe hath ſo precipitous a Courſe, that there is neither place for deliberation, nor is there frequently any Phyſician to be gotten, for fear of the Contagion; wherefore, there is no need here of of many preſcripts, or a long ſeries of Indications; this buſineſs is to be quickly performed, and may be comprehended in a few things. Therefore, when the peſtilence reigning, any one is diſtempered with the Contagion of this Diſeaſe, the help of the omnipotent God being requeſted by Prayers, preſently Remedies are to be flown to: If the Plague happens in a body not throughly purged, and prone to Vomiting, preſently let a Vomit be taken, whoſe operation being finiſhed, immediatly let a ſweat be provoked, by taking Diaphoreticks, and the ſame continued as ſtrength can bear it, and afterwards be often repeated. Beſides, let Alexipharmicks or Poyſon-reſiſters, be uſed almoſt every moment, until by the eruption of Whelks, Inflamations, or Buboes, all the Venom be wholly driven forth of doors: but in the mean time, proper and reſpective Remedies, are to be oppoſed to the moſt urging Symptoms: but eſpecially, fit helps are to be ſought from Chirurgery, for the cure of the Buboes, and Plague-ſores: the whole weight of this buſineſs, leans on theſe two Intentions, that the peſtiferous Poyſon may be every way expelled from within, and then, that the recourſe of what is driven forth, be with equal diligence prevented.

Concerning the Plague, we cannot ſo readily write examples, and hiſtories of ſick perſons, with exact diaries of the Symptoms: becauſe theſe kind of ſickneſſes came not every year, neither when they ſpread, is it lawful for every Phyſician that takes care of his own health, frequently to viſit the ſick, or to ſtay long with them, whereby he may denote all accidents, and diligently conſider the reaſons of them; which task however, the renowned Diemerbrochius, did ſo firmly perſiſt in, that after him, others may

may lawfully be ſuperſeded from this work: when ſomtimes paſt, in this City, *viz.* 1645. the Plague (tho not great) had ſpread, Doctor *Henry Sayer*, a very learned Phyſician, and happy in his practice, many others refuſing this province, boldly viſited all the ſick, poor, as well as rich, daily adminiſtred to them Phyſick, and handled with his own hands, their Buboes, and virulent Ulcers, and ſo cured very many ſick, by his ſedulous, tho dangerous Labour. That he might fortifie himſelf againſt the Contagion, before he went into the infected houſes, he was wont only to drink a large draught of Sack, and then his perambulation about the borders of Death, and the very jaws of the Grave being finiſhed, to repeat the ſame Antidote; After he had in this City, as if inviolable as to the Plague, a long while taken care of the affairs of the Sick without any hurt, he was ſent for to *Walling ford*-Caſtle, where this Diſeaſe cruelly Raged, as another Æſculapius, by the Governour of the place: But there being ſo bold, as to lye in the ſame Bed, with a certain Captain (his intimate Companion) who was taken with the Plague, he quickly received the Contagion of the ſame Diſeaſe: nor were the Arts then profitable to the Maſter, which had been helpful to ſo many others, but there, with great ſorrow of the Inhabitants, nor without great loſs to the Medical Science, he dyed of that Diſeaſe. As to others, diſtempered by the Peſtilence, he was wont to order this kind of method of healing, if he was ſent for before the Buboes or Whelks appeared outwardly, for the moſt part he gave a Vomit, the preſcriptions of which were of the Infuſion of *Crocus Metallorum*, ſomtimes with white, and ſomtimes with Roman *Vitriol*: The Vomiting being ended he commanded them to be preſently put into a ſweat by the taking of Diaphoreticks; and thence, ſome intervals being granted, for the recovery of ſtrength, the ſweating to be continued to the declination of the Diſeaſe: but if he were ſent for to the ſick, after the appearances of the marks, the Vomiting being let alone, he inſiſted only upon Sudorificks.

Chap. XIV.

Of Peſtilential and Malignant Feavers in ſpecie, *and of others Epidemical.*

After having unfolded the Nature of the Plague, by the order of our Tract, we ought to proceed to the Diſeaſes, which ſeem to be neareſt like its Nature; which chiefly are Feavers, called Peſtilent and Malignant; for tis commonly noted, that Feavers ſomtimes reign popularly, which for the vehemency of ſymptoms, the great ſlaughter of the ſick, and the great force of contagion, ſcarce give place to the Peſtilence; which however, becauſe they imitate the type of Putrid Feavers, and do not ſo certainly kill the ſick as the Plague, or ſo certainly infect others, they deſerve the name not of the Plague, but by a more minute appellation of a Peſtilential Feaver: Beſides theſe, there are Feavers of another kind, the perniciouſneſs and Contagion of which appear more remiſs, yet, becauſe they are infeſtous, beyond the force of Putrid Feavers, and ſeem to contain in themſelves in a manner, the Τὸ Θεῖον or hand of God of Hippocrates, are yet by a more ſoft appellation, called Malignat Feavers.

Thoſe Feavers differ both from the Peſt, and from one another according to the degree, and vehemency of contagion and deadlyneſs: as the Plague is a Diſeaſe highly contagious, and deadly to human kind; tis the Peſtilent Feaver, which commonly ſpreads with a leſſer diffuſion of its infection, and frequency of burials. When the infection is only ſuſpected, and the Criſis happens beyond the event of vulgar Feavers, only not to be truſted or leſs ſafe, tis eſteemed for a Malignant Feaver. They are yet more fully deſcribed thus.

When the Feaver commonly ſpreads abroad, which for the variety of ſymptoms, puts on the likeneſs of the Putrid Feaver ſo called, to wit, when there are preſent, Thirſt, Burning, Wearineſs, Anxiety, roughneſs of the Tongue, Watchings, Phrenſie, Vomiting, want of Appetite, Syncopy, Swooning, Heart-pains, and a concourſe of other moſt terrible accidents; if there happen beſides, ſpots either like to the little Flea-bites, or broad ones like black and blew ſtrokes, and livid, we eſteem this diſeaſe of an evil Nature. If beſides theſe, it is not cured after the wonted manner of

Feavers, but that the ſtrength of the ſick is caſt down, without any manifeſt cauſe, and that death comes often unlooked for and unſuſpected, againſt the Prognoſtic of the Phyſician, there is yet a greater cauſe of ſuſpicion of malignity: But if it kills very many of the ſick, and that thoſe who converſe with the ſick, contract the evil of the ſame Diſeaſe, that the ſame Diſeaſe ſpreads through all the Villages or Cities, it may be ſaid to be more than malignant, a peſtilential Feaver; which is yet fully proved, if it rages in very many ordinarily with a certain common ſymptom, as when a Squinancy, Dyſentery or deadly Sweat, ſuch as in times paſt ſpread in *England*, accompany theſe ſort of Feavers.

If that a Feaver ariſes, which Diſtempers many living in the ſame Region together, almoſt after the ſame manner, which notwithſtanding obſerves the laws of a common Putrid Feaver in its courſe, and is cured almoſt after the ſame manner, this is not ſaid to be Peſtilent, but only a Malignant Feaver; unleſs that in ſome labouring with a remarkable Cacochymy, or fulneſs of ill humors, the appearances of Buboes, or of ſpots, ſomtimes with a deadly Criſis, and a contagion creeping upon others, betray ſome ſigns of Malignity.

If it be demanded, to which Claſs of the aforeſaid Feavers, theſe ſort of Peſtilential and Malignant Feavers ought to be placed, we aſcribe them only to the rank of continual Feavers; we diſcharge or acquit intermitting Feavers, becauſe by intervals they grant ſuch firm Truces to Nature, and then they regularly and exactly obſerve their periods, which does not conſiſt with an invenomed diſpoſition. Alſo we except Hectic Feavers from malignity, becauſe otherwiſe their mortality would not be ſo long delayed, but that partaking of Poyſon, they would kill ſooner: among continual Feavers, altho we affirm, that the ſimple ſynochal Feavers, are not free, yet they are rarely touched with this evil: but moſt of all, the Feaver which ſhews the notes of peſtility or malignity, is of that ſort, which reſembles the figure of the Putrid Feaver ſo called: for when in theſe Feavers, beſides the appearances of virulency, we perceive a continual growing hot of the Blood, which paſſes through the courſes or ſtadia of beginning, increaſe, ſtanding and declination, as in Putrid Feavers, we deſervedly affirm here, the Sulphureous part of the Blood to be heated and inkindled, and by its burning to have brought in the Feaver: wherefore in theſe kind of Feavers, two things are eſpecially to be noted, the growing hot of the Blood and the malignity joyned with it, of which now this, now that is the greater: alſo, in both there is a great Latitude, and very many degrees of its intenſion or heat, according to which the Feaver becomes more or leſs acute or malignant.

The growing hot of the Blood is performed after the ſame manner, as is already ſaid concerning Putrid Feavers: to wit, the Sulphureous part of the Blood growing hot above meaſure, as it were takes fire by its fervor; in the time of its burning it accumulates a great quantity of aduſt matter, upon whoſe ſubaction and ſecluſion, depend the ſtate and Criſis after the wonted manner of Feavers: but beſides theſe, the Blood being infected with a certain venomous taint, in the burning it begins by reaſon of the malignant ferment, to be coagulated into parts, and to putrifie: wherefore beſides the uſual ſymptoms of the common Feaver, by reaſon of ſome congealed portions of the Blood, follow either deadly Diſtempers, Swooning, a dejection of the Spirits, alſo appearances of ſpots and marks: beſides venomous *Effluvia*, which depart from the ſick, that are able to raiſe up the like Diſtemper in others, by the force of their contagion; wherefore by reaſon of its perniciouſneſs and contagion, and their various degrees, it is called, either a Peſtilent or Malignant Feaver.

Alſo whilſt the Blood growing hot, is infected with a venomous and malignant ferment, not only proper coagulations of its maſs, with a diſpoſition to putrifaction, are induced; but alſo the Nervous Liquor, eaſily contracts the taint of this, from whence it being made improportionate to the Brain and Regiment of the Animal Spirits, ſtirs up great irregularities in them: wherefore upon theſe ſort of Feavers, come not only ſpots and whelks, but moſt often a Delirium, Phrenſie, Sleepineſs, Tremblings of the Limbs, Cramps, and Convulſive motions; I have often obſerved, that in ſome certain years, Malignant Feavers have increaſed, which have ſhown their virulency, without the appearances of marks, chiefly about the Nervous ſtock; becauſe in ſome, preſently after the beginning, has followed a ſleepineſs, with a mighty heavineſs of the Head, in others, ſtrong Watchings, a perturbation of mind, with Trembling and Convulſive motions, but in moſt, either none, or only an uncertain Criſis, and inſtead of it, a tranſlation of the Feaveriſh matter to the Brain; beſides it is obſerved, that theſe Feavers creep upon others by contagion, and that very many are killed by them, that therefore they do deſerve to be called Malignant.

But

But theſe kind of Feavers are ſomtimes firſt begun from a venomous infection, and the Blood being touched with the Particles of the venom, conceives of it ſelf an Effervescency, and is inkindled; as when from a contagion or malignant Air being inſpired, any one hath fallen into a Malignant Feaver, without any evident cauſe or prediſpoſition: But ſomtimes the Feaveriſh Diſtemper is induced from a proper cauſe, and then the ſeeds of the Malignity, either lying hid within in the Body, exert themſelves in the Effervent Blood, or they come from another place by the contaminated Air, as it were the Food of the flame before inkindled; for it appears by frequent obſervation in the time in which an Epidemical Feaver ſpreads, that others being any way ariſen, turn into it.

Malignant Feavers, as alſo Peſtilential, for the moſt part are popular, and invade many at once: but ſomtimes they are private, and not ordinary, ſo that perhaps only one or two are taken in the whole Region; in ſuch a caſe, it is to be ſuſpected that they come not from a malignant Air, or Epidemical cauſe, but from a morbous proviſion of the Body; for I have often obſerved that when in the Spring or Autumn, a Feaver ſufficiently common, hath ſpread in ſome City or Town, of which very many have dyed, perhaps ſome one on whom an evil prediſpoſition, and a more ſtrong evident cauſe, hath brought the Feaver, hath lain by it, with more horrid ſymptoms, and great notes of malignity: in which caſe that malignity is not to be called common to the Feaver, but not ordinary, and accidental only.

Altho the greateſt reaſon of the difference, by which theſe kind of Feavers are diſtinguiſhed from one another, and from other Feavers, conſiſts in their deadlineſs and contagion; yet ſomtimes, they are noted with a certein peculiar ſymptom, from which they take for that time, both the note of malignity, and the appellation of the name: hence in ſome years an Epidemical Feaver reigns, which induces to moſt of the ſick a Squinancy, another time an inflamation of the Lungs, a Pleuriſie, Dyſentery, or ſome other diſtemper, and that oftentimes moſt dangerous, and contagious: ſo the ſeeds of Diſeaſes, not only derived from the Parents by traduction, excite their fruits as it were by a certain deſignation, in the ſame part or member; but alſo, thoſe received from an Infection commonly ſpreading, produce in all, a diſtemper of the ſame mode and figure: which yet I think to happen, not becauſe the ſeeds of the venomous Infection, reſpect either this or that Region of the Body, with a certain peculiar Virtue; but theſe ſo affect the maſs of Blood, by a like manner in all, that there is a neceſſity, for the ſake of waſhing away this ſtain, that a Criſis be attempted after the ſame manner in all. For when, without malignity, the Blood, by reaſon of Coagulation, or perhaps other cauſes, is apt to be extravaſated, the uſual places, in which portions of the ſame being extravaſated, are wont to be fixed, are the Throat, Pleura, Lungs, and Inteſtines: wherefore, 'tis no wonder, when from a malignant cauſe, the congelation of the Blood, and for that reaſon an extravaſation is induced, if the Diſeaſe is neſted in the accuſtomed cheriſhing place of Nature.

Concerning the cauſes of theſe kind of Feavers, there is not much buſineſs: they are for the moſt part deduced, in reſpect of the malignity, from the vicious Conſtitution of the Air; in reſpect of the Feaveriſh heat, from the morbous proviſion of the Body: either of theſe, are eaſily made clear, by what hath been already ſaid, concerning a Putrid Feaver, and the cauſes of the Peſtilence: If the malignity be ſtronger than the Feaver, and hath induced it, the impreſſion of it is to be imputed to the inſpired Air, or to a Contagion received from others; if the Feaver be firſt, its inkindling is aſcribed to tranſpiration being hindred, to a Surfeit, or to ſome other of the evident cauſes above enumerated.

As to the ſigns, beſides contagion and deſtruction, theſe ſhew the malignity of the Feaver, a ſudden loſs of ſtrength, a weak and unequal pulſe, and evil affection of the Brain and nervous parts, being ſuddenly induced, cruel Vomitings, blackneſs of the Tongue, a ſuffuſion of darkneſs through the whole Body, but chiefly the appearances of Spots, Buboes, and of other marks.

For the cure of Feavers, both Peſtilential and Malignant, there is greater need of Judgment, and Circumſpection, than in any others whatſoever: For when there are two primary Indications, to wit, the Malignity, and the Feaveriſh intemperance, and when one can ſcarcely provide for the one, without detriment to the other, it is not eaſily to be diſcerned, which ſhould firſt be helped, or ſooneſt regarded. In reſpect of the Feaver, purging, opening a Vein, and cooling things, do chiefly help; but whilſt theſe are performed, the Malignity, for the moſt part is increaſed, and being neglected, ſpreads abroad more largely its Poyſon: againſt the Malignity, Poyſon-reſiſting Cordials, and Diaphoreticks are required, but theſe extreamly heighten the Feaver, they more

more ſhake the Blood and Spirits before inkindled, as it were with the blaſt of Bellows, and force all as it were into a flame; wherefore, here is great need of skill, that theſe things be rightly ordered in themſelves, and where there is moſt of danger appearing, thence the Curative Intentions are to be more immediatly deſigned; but ſo, as whilſt one is conſulted about, the other be not neglected. But in theſe caſes, beſides the private Judgment of every Phyſician, experience may ſupply the chief means of healing: for when as theſe Feavers firſt ſpread, every one almoſt tryes ſeveral Remedies, and by the ſucceſs of them collated together, it may be eaſily reckoned, what kind of method is to be relyed on, till at laſt, by a frequent tryal, or the footſteps of thoſe paſſing before, there is made as it were a high and broad Road, for the curing of theſe ſorts of diſtempers, bounded both with various obſervations and warnings.

Beſides theſe ſort of Feavers, which ſpread on many at once, and by reaſon of the Contagion, deadlineſs, and conſpicuous notes of virulency, deſerve to be called Peſtilent or Malignant; there are ſome others, epidemical or popular, which almoſt every year, either in the Spring or Autumn, rage in ſome Countries; of which the Inhabitants for the moſt part of them are wont to be ſick, and not few, eſpecially of the Elder, to dye: In which notwithſtanding, no ſigns of Peſtilence or Malignity appear, neither does the Diſeaſe ſeem to ſpread, from one and ſo to another, ſo much by Contagion, as to lay hold on many, by reaſon of a prediſpoſition, impreſſed almoſt on all. But theſe kind of diſtempers, depend chiefly upon the foregoing Conſtitution of the year: for if the ſeaſon going before was very intemperate, by reaſon of exceſs of cold or heat, of dryneſs or humidity, and ſo had continued for a long time, it changes our Blood very much, from its due temperature, whereby it is apt afterwards to conceive Feveriſh effervеſcencies; and from hence a Feaver, now of this Type or Figure, now of that is produced; which preſently becomes Epidemical, becauſe it draws its beginning from a common cauſe, wherewith the bodies of all, are in a manner affected: But ſuch Feavers, foraſmuch as they depend upon the Blood having gotten a diſpoſition, now ſharp, now auſtere, or of ſome other kind, by reaſon of the temper of the year, for the moſt part are of the rank of intermitting Feavers: yet, by a proper proviſion of Symptoms, they are wont to be noted, according to the peculiar Conſtitution of every year. Theſe are not able to be comprehended, under a certain common rule, or formal reaſon, which may quadrat to the nature of each of theſe; becauſe they vary every year, according to their ſeveral accidents. However, we will give you the deſcriptions of theſe kind of Feavers, ſpreading of late years in this Region, had at that time, for ſome ſpecimen of the reſt, and add it for a concluſion at the end of this Tract.

There yet remains to be aſcribed to the rank of malignant Feavers, ſome other private Feavers, and participating of no Contagion: of which ſort chiefly are thoſe, which are wont to happen to Child-bearing women, by reaſon of difficult and hard labour, or by reaſon of the ſtoppage of their Courſes. Indeed it ſufficiently appears, by common obſervation, that theſe are very dangerous, and often mortal: for if, by the parts of the Womb being hurt, or by cold being admitted, or perhaps by any other cauſe, the Courſes are ſtopped, and the humour which ought to be thruſt forth, ſhall be confuſed with the maſs of the Blood, it moſt wickedly infects it, as it were with a certain venomous mixture; that by that means, preſently a Feaver is excited, which with an evil proviſion of Symptoms, is very much beſet, *viz.* with heat, and cruel thirſt, Vomiting, pain of the Heart, and watchings, and for the moſt part obtains, either no Criſis, or a very difficult one: becauſe, unleſs the wonted way of the flux of the Courſes, may be at length reſtored, it is wont, after the heat of the Blood hath been continued for ſome days, to Communicate the evil to the Brain, and nervous ſtock; from whence, by and by, a Delirium, Phrenſie, Convulſions, and other moſt wicked diſtempers, are moſt often induced, which do not ſeldom end in Death: but theſe ſort of Feavers deſerve a peculiar conſideration which we have more fully determined to ſhew hereafter in a particular diſcourſe concerning this buſineſs; in the mean time, we will undertake to propoſe ſome inſtances or examples of the Feavers, but now delivered, *viz.* of the Peſtilent, and Malignant.

The peſtilent Feaver, of late years, hath more rarely ſpread in theſe Regions, than the Plague it ſelf: of the only one of this kind, which fell under our obſervation, I will give you a brief deſcription. In the year 1643, when in the coming on of the Spring, the Earl of *Eſſex* beſieged *Reading*, being held for the King, in both Armies there began a Diſeaſe to ariſe very Epidemical; however, they perſiſting in that work, till the beſieged were forced to a ſurrender, this Diſeaſe grew ſo grievous, that in a ſhort time after, either ſide left off, and from that time, for many months, fought not with the Enemy

Enemy, but with the Diſeaſe: as if there had not been leiſure to turn aſide to another kind of Death, this deadly Diſeaſe increaſing, they being already overthrown by Fate, and as it were falling down before this one Death. *Eſſexe*'s Camp moving to the *Thames*, pitched in the places adjacent, where he ſhortly loſt a great part of his men: But the King returned to *Oxford*, where at firſt, the Souldiers being diſpoſed in the open Fields, then afterwards among the Towns and Villages, ſuffered not much leſs: For his Foot, (which it chiefly invaded) being pact together in cloſe houſes, when they had filled all things with filthineſs, and unwholſom naſtineſs, and ſtinking odors (that the very Air ſeemed to be infected) they fell ſick by Troops, and as it were by Squadrons. At length the Feaver now more than a Camp Feaver invaded the unarmed and peaceable Troops, to wit, the entertainers of the Souldiers, and generally all others, yet at firſt (the Diſeaſe being yet but lightly inflicted) tho beſet with an heavy and long languiſhment, however many eſcaped. About the Summer Solſtice this Feaver began alſo to increaſe with worſe proviſion of Symptoms, and to lay hold on the Huſbandmen, and others inhabiting the Country. Then afterwards, ſpread through our City, and all the Country round, for at leaſt Ten miles about. In the mean time, they who dwelt far from us, in other Counties remained free from hurt, being as it were without the ſphere of the Contagion. But here this Diſeaſe became ſo Epidemical that a great part of the people was killed by it; and aſſoon as it had entred an houſe, it run through the ſame, that there was ſcarce one left well to adminiſter to the ſick; ſtrangers, or ſuch as were ſent for to help the ſick, were preſently taken with the Diſeaſe; that at length, for fear of the Contagion, thoſe who were ſick of this Feaver, were avoided by thoſe who were well, almoſt as much, as if they had been ſick of the Plague.

Nor indeed, did there a leſs mortality, or ſlaughter of men, accompany this Diſeaſe: becauſe Cachectic, and Pthiſical old men, or otherways unhealthful, were killed by it; alſo not a few of Children, young men, and thoſe of a more mature aud robuſt age. I remember in ſome Villages, that almoſt all the old men dyed this year, that there were ſcarce any left, who were able to defend the manners and priviledges of the Pariſh, by the more anciently received Traditions.

When this Feaver firſt began, it was ſomthing like the figure of a putrid Synochus; but it was harder to be cured, and when it ſeemed to be helped by a ſweat or looſneſs, preſently it was wont to be renewed again: but for the moſt part, after the deflagration of the Blood, continued for ſix or ſeven days, this remitting, and inſtead of a Criſis the aduſt matter being tranſlated to the Brain, the ſick for a long time keeping their Beds with raging ſomtimes, but more often with a ſtupefaction, with great weakneſs, and ſomtimes with Convulſive motions, ſcarcely eſcaped at laſt. About the middle of the Summer, beſides the Contagion and frequent burials, this Diſeaſe betrayed its malignity, and peſtilential force in open ſigns, *viz.* By the eruption of Whelks and Spots: becauſe about this time in many there appeared without any great burning of the Feaver, an unequal, weak, and very much diſordered pulſe; alſo without a manifeſt expenſe of Spirits, their ſtrength preſently became languiſhing, and very much dejected: In others, ſick after the ſame manner, appeared little Bliſters or Meaſles, now ſmall and red, now broad and livid: in many, Buboes, (as in the Plague) about the glandulas: of theſe ſome died ſilently and unforeſeen, without any great ſtrugling of the Spirits, or Feaveriſh burning excited in the Blood: in the mean time others, by and by becoming furibundous, whilſt they lived ſuffered moſt horrid diſtractions, of the animal Spirits. Thoſe about to eſcape from this Diſeaſe, without any laudible Criſis, (unleſs they were the ſooner freed by a ſweat provoked by Art) the Brain, and nervous ſtock becoming diſtempered, at length, with a benummedneſs of the ſenſes, tremblings, vertigo, debility of the members, and Convulſive motions, did not grow well but of a long time after. During the Dog-days, this Diſeaſe being ſtill infeſtous, began to be handled not as a Feaver, but as a leſſer Plague, and to be overcome only by Poyſon-reſiſting Remedies; letting of Blood, was believed to be fatal to this: Vomits, and Purges, ſomtimes tho not often, were made uſe of, but the chiefeſt means of Cure, were accounted to be procured by Alexiteriums, and timely ſweat. For this end, beſides the preſcripts, of Phyſicians, to be had at the Apothecaries, ſome Emperical Remedies deſerved no ſmall praiſe; then firſt of all, the pouder of the Counteſs of *Kent*, began to be of great eſteem in this Country; alſo of no leſs note was another pouder, of the colour of Aſhes, which a certain Courtier ſtaying by chance in this City, gave to many with good ſucceſs; and to others approving of the uſe of it, he ſold it at a great price; the ſick were wont having taken half a dram of this, in any Liquor, to fall into a moſt plentiful ſweat, and ſo to be freed from the virulency of the Diſeaſe;

Diſeaſe; That Diaphoretick (whoſe preparation I afterwards learnt, from the Couſen German of the Author) was only the pouder of Toads, purged throughly with Salt, and then waſhed in the beſt Wine, and lightly calcined in an earthen Pot. The Autumn coming on, this Diſeaſe by degrees remitted its wonted fierceneſs that fewer grew ſick of it and of them many grew well; till the approach of the Winter, when this Feaver almoſt wholly vaniſhed, and health was rendred to this City, and the Country round about fully and wholly.

Thus you have ſeen the beginning, progreſs, and end of this Feaver, at firſt only a Camp Feaver, but at length became Peſtilential, and Epidemical. That at firſt the Diſeaſe began in the Souldiers Camp, may ſeem to be imputed, not only to their naſtineſs, and ſtinking ſmells, but in ſome ſort to a common vice of the Air, for as theſe Feavers come not every year, their original may be aſcribed, partly to the peculiar Conſtitution of the year. Becauſe, by that means, a more light intemperance of the Air being contracted, tho it did not affect the more healthful Inhabitants; yet in the Army, where evident cauſes, *viz.* errors in the ſix non-naturals, very much happen to the general procatartic cauſe, there is a neceſſity for theſe kind of ſickneſſes eaſily to be excited. For the conſtitution of this year, was in the Spring very moiſt, and ſlabbery, almoſt with continual ſhours, to which a more hot Summer ſucceeding, and the infection of the Feaveriſh Contagion here firſt increaſing, ſtill grew worſe, and diſpoſed all Bodies the more for the receiving it; wherefore, that this Diſeaſe was almoſt proper to this Region, and at this time Epidemical, the ſeed of it ought to be aſcribed to its firſt riſing from the Army, being quartered round about. But forafmuch, as it afterwards being made Peſtilential, and very Epidemical, it infected moſt of the people living here, and killed not a few, the reaſon was, the evil affection of the Air; which becauſe of the intemperance of the year being unwholſom, beſides by the continual breathing forth of ſtinking vapours from the Souldiers Camps, and the quarters of the ſick, it became at laſt ſo vitious, that the infection of the Feaver, being diſperſed in it, was greatly exalted, and aroſe almoſt to the virulency of the Plague. *Diemerbrochius* relates from the like Camp Feaver, ariſing in the Summer at *Spires*, afterwards another Malignant and Peſtilential, and then the Plague it ſelf to have accrewed. Alſo, it was a ſign that this Feaver of ours, became at laſt equal to the Plague it ſelf, beſides the great force of the Contagion, and the frequency of Burials, moſt wicked diſtempers of the Blood, and nervous Liquor, being brought preſently upon all, by it: becauſe, ſtrength being ſuddenly overthrown, the weak intermitting pulſe, the creeping forth of meaſly Bliſters, the eruption of Buboes, argued the Coagulation, and corruptive diſpoſition of the Blood: beſides the Delirium, Madneſs, Phrenſie, Stupefaction, Sleepineſs, Vertigo, Tremblings, Convulſive motions, and divers other diſtempers of the Head, ſhewed the great hurt of the Brain, and nervous ſtock.

That the figure, or Idea of this malignant Feaver, may be painted to the life, very many obſervations or hiſtories of ſick people, are eaſily to be had; of the many examples of this Diſeaſe, I ſhall only mention a few, which hapned ſome years ſince in the houſe of a venerable man, and as with a mournful ſlaughter, ſo not without ſome admiration.

About the Winter Solſtice, in the year 1653. a youth of about Seven years old, without any manifeſt cauſe, found himſelf ill, being troubled with a pain of his Head, Sleepineſs, and mighty Stupefaction; with it he had a Feaver, tho not ſtrong, with an ordinary burning, which grew more grievous, only by wandring fits, ſomtimes once, ſomtimes twice in Twenty four hours ſpace: preſently from the beginning, he ſlept almoſt continually, alſo he was wont in his ſleep to cry out, to talk idly, and to leap often out of his Bed; being awakned, and ſomtimes of his own accord awaking, he preſently came to himſelf, and conſtantly called for drink; his Urine was red, and full of Contents, his pulſe equal, and ſtrong enough; in his wriſts appeared light contractures of the tendons, and in his neck, and other parts of his Body, ſome red ſpots like Flea-bites. At the firſt, was ordered a light Purgation, and a frequent taking down of the Belly, by the uſe of Clyſters; he daily took Cordial Julaps, with Poyſon-reſiſters; Veſicatories or bliſtering Plaſters, were applyed to his neck, and other Plaſters to the ſoles of his feet: on the ſixth day, a little Blood ſtreamed from his noſtrils; on the ſeventh, without any manifeſt through Criſis, the Feaver very much abated, the heat ſo gentle as to be perceived only by the Touch; alſo, the Urine pale, thin, and without any ſediment, yet he was much more grieviouſly troubled with ſleepineſs, and a ſtupefaction of the Head, ſo that his Urine, and the excrements of his Belly came away involuntarily; however, being called upon, he knew the ſtanders by, and anſwered to their queſtions; Theſe diſtempers, notwithſtanding the Remedies every day

grew

grew worſe: About the Fourteenth day, the ſick youth became ſo ſtupid, as neither to be able to underſtand, nor to ſpeak, yet he ſwallowed ſtill what was put into his mouth, tho unknowingly, and his pulſe was laudable enough: about this time, he fell into a Flux, excited of it ſelf by Nature for four days, which at laſt ceaſing, a whiteiſh cruſt or ſcurf, and as it were Chaulky, began to ſpread over the whole cavity of his Mouth and Throat, which being often in a day wiped away, new preſently broke forth: when he had thus for four days more been ſick, he became better in his intellect, and ſenſe, ſo that he was able to know his Parents and Friends, to take notice of their words, and to do ſomthing as he was bid: but as his ſenſitive faculty began to be reſtored, ſo he began to grow worſe as to his ſpeech and the Organs of ſwallowing; without doubt the matter being fallen from the Brain, into the beginnings of the Nerves, a Palſie in the Tongue and Throat had ſucceeded to the heavineſs and ſtupefaction: which diſtemper in a ſhort time ſo increaſed, that afterwards the ſick perſon could not ſwallow at all, but that what he took in at the Mouth preſently flowed back again, neither could any thing go down into the Stomach; when beſides the cruelty of the Diſeaſe, there was danger leaſt he ſhould be killed by Famine, an Inſtrument was prepared of a pin of Chalk, put into a little pliant wand, and on the top of it, a little tuft of ſilk made fit; and this being thruſt down his Throat, opened the cloſing for a time, whereby the Food taken in, was ſuffered to paſs, after the uſe of this for a day or two, he was able to ſwallow again, and afterwards to take his Food well enough: and within a few days, he began to ſpeak, to diſcern any thing, and becoming wonderful hungry, to ask for, all day long, all ſorts of Food, and greedily to devour whatever was brought to him. In the mean time, by reaſon of his long ſickneſs, and the Nervous parts being grievouſly hurt; he was grown ſo Lean, that the Bones ſcarce ſticking to the Skin, he repreſented exactly a living Skeleton. But afterwards, by the ſedulous, indefatigable, and prudent care of the Mother about his diet, he recovered perfect Health, and is yet living, and well.

When this child had hardly arived to the height of his ſickneſs, his Brother, elder about two years, on the Ides of *January*, was taken almoſt after the ſame manner. At firſt he was troubled with a Torpor and heavineſs of the Head, then growing Feaveriſh, with a ſleepineſs and ſtupidity: he began to talk idly in his ſleep, then being awake hardly to come to himſelf: after four or five days, theſe ſymptoms grew more grievous: he was able to underſtand little, nor ſcarce to ſpeak articulately, and not without ſtammering. His Urine was thick, cloudy, without Hypoſtaſis, or ſetling of the Contents: there appeared, as in his Brother, red ſpots, ſmall, like Flea-bites; his Excrements both of his Belly and Bladder, came away involuntarily. But his Pulſe was yet ſtrong and equal; his Hypochondria were ſtretched out, and inflated with a tumor of the Abdomen; about the eighth day, he had a ſmall ſtream of Blood: on the eleventh day of his ſickneſs, he fell into a Diarrhæa, by which, in the ſpace of five hours, he caſt forth ſeven times, bilous, thin, and highly ſtinking ſtuff, from whence there was ſome hope of his amendment; but the next day after, the flux of his Belly ceaſing, pains, and torments cruelly infeſted his Belly, that crying out and moaning night and day, he ſent forth moſt heavy complaints; his Hypochondria and Abdomen were tumid like a Tympany, and mightily diſtended; when he could not receive any thing of eaſe, from no remedies, the moſt exquiſite skill of many Phyſicians being tryed, on the fourteenth day he died Convulſive, in theſe torments.

A little after his death, *viz.* on the thirteenth of *February*, his Brother, elder than him, about eleven years old, a youth of great hopes, began to be Feaveriſh; and as the others, with a Torpor and heavineſs of his Head, tho leſs ſtrongly affected; but the heat in the Blood was greater, which was of a more hot temperament, and greater perturbation appeared, that for the firſt ſix days, beſides heat and thirſt, he was troubled with a continual endeavour of excretion, now by ſweat, now by ſtool. His Urine was red and troubled; ſome red ſpots, as in the reſt broke forth; on the ſeventh day he had a bleeding about five Ounces, which ceaſing, a great benumedneſs ſucceeded, that for all that day and the night following, he could ſcarce lift up his Eyes: on the eighth day, a moſt plentiful bleeding followed again at the Noſe, that there was danger, leſt he ſhould have loſt his life, together with his Blood: the Blood ſprang ſo copiouſly from his left noſtril, that being received in a Baſon, it made little Bladders or bubbles by its fall: when he had loſt above two pound of Blood, and being taken with a cold ſweat, began to loſe his ſtrength, remedies were at length adminiſtred, and the Flux was yet hardly ſtopped. The Hæmorrhage being ſtayed, the Youth ſlept ſoundly, and all that day became ſleepy: yet often awakning, he remained well in his ſenſes and was quick in ſenſe, and underſtanding; and being asked of his health, he ſaid he was pretty well; his

Urine, which was before red and troubled, then appeared pale, thin, and with a laudable Hypoſtaſis, that the ſick ſeemed, (eſpecial becauſe he wanted thirſt, or immoderate heat) to be perfectly cured and freed from the Feaver: on the following morning, being the ninth day of the Feaver, he remained yet torpid, but being raiſed up, he living chearfully and without intemperance, ſeemed to be in a condition of growing well, but that he began a little to faulter in his ſpeech: in the evening, when it was leſt ſuſpected, the Feaver being again inkindled, on a ſudden he fell into a Lethargy, that he was ſcarce able to be awakned from ſleep, and being pulled, ſcarce to know any body, or to ſpeak plainly: altho ſo great a loſs of Blood had gone before, the Pulſe was yet quick, high, and vehement, alſo his Urine red: after deriving, and withdrawing remedies, had been uſed all that Night, this Youth ſeemed to be in a little better condition, ſo that in the morning, he continued a long time from ſleep, but began to role about his Eyes hither and thither, and to ſet himſelf up a little; yet without ſpeaking, or knowledg of thoſe that were about him: before noon, his Eyes being ſhut again, he wholly loſt the uſe of every Animal faculty: he lay for three days, as it were Apoplectick, with an high and vehement Pulſe, with a palpitation of the Heart, and a difficult and painful breathing; his Pulſe at length growing leſſer by degrees, he dyed the thirteenth day of the Feaver.

On the fifteenth of *February*, his Siſter, ſomwhat leſſer than he was, began to complain of a pain and torments in her Belly, a trembling in her hands, and a painful tenſion or ſtretching out of the Muſcles of her Neck, with a Feaveriſh intemperance, and thirſt: on the laſt day of *February*, ſhe growing plainly into a Feaver, could not keep out of her Bed: moreover ſhe was troubled with a wandring heat, now in her Face, now about her lower parts; alſo ſhe became heavy and ſomnolent, and awaking from ſleep, could not preſently come to her ſelf. On the firſt of *March* ſhe was lightly Purged and with eaſe, with an expreſſion of Rhubarb: her Urine was thick and red; elſo petechial red ſpots, (as in the reſt) were conſpicuous: we gave her after that, for four days, at ſeveral times, to wit, after the interval of every ſix hours ſpace, ten drops of the ſpirit of Harts-Horn, in a Spoonful of Cordial Julep; the aforeſaid ſymptoms afterwards leiſurly remitted, and this ſick child, tho ſlowly, recovered health without a manifeſt through Criſis.

About the ſame time her little Brother, younger than any of theſe, fell ſick almoſt after the like manner; who, yet, a looſneſs ariſing Naturally of it ſelf, for many days, voyding Choleric and greeniſh ſtuff, was eaſily cured. Alſo in the ſame Family, many other Domeſtics, and ſome ſtrangers coming to help them, the evil being propagated by Contagion, fell ſick of the ſame Diſeaſe: who notwithſtanding, at length became well, tho with difficulty, and ſlowly, without any regular Criſis being made.

That this Feaver was malignant, plainly appears by the Contagion, Mortality, and appearances of ſpots, and many other ſigns; tho that infecting Contagion, whereby it ſpread from one to another, ſhewed it ſelf ſlow, and of leſſer Efficacy: becauſe, between the ſickneſſes of each of them, many days, and oftentimes weeks hapned to be, that the infection of this tho acute Diſeaſe, and the diſſemination on others, was ſcarcely finiſhed in four months ſpace, in the ſame Houſe. The Feaver about the firſt beginning ſeemed gentle and mild, not very terrible as to burning; but the matter being heaped together, from the deflagration of the Blood, became preſently untameable, hard to be exterminated, alſo enemical to the Brain and Nervous ſtock; wherefore in each of them, the beginning of the Diſeaſe, was to be known rather by the torpor and ſomnolency, than the fervor and heat; alſo, the Criſis, tho by ſeveral ways attempted, *viz.* by Sweat, Flux, Bleeding, did not happily ſucceed, but for moſt part, the Blood growing turgid with the critical motion, endeavoured to tranſfer the Feaveriſh matter, upon the dwellings of the Animal Spirits; yet it ſelf notwithſtanding, became not putrified by this means, but that about the ſtanding of the Diſeaſe, both humors (to wit the Blood and Nervous Juice) being vitiated, by an impure mixture together, and grievouſly touched, cauſed the event of the Diſeaſe, to be either deadly, or extream dangerous.

CHAP. XV.

Of the Measles and Small-Pox.

IN the next place, we refer the Small-pox and Measles to the rank of pestilential and malignant Feavers, which indeed are mixt Distempers, consisting at once according, and contrary to our Nature. As to their Original, they have their seminary born with us: but as to the effect, they produce preternatural symptoms, and (as the Plague it self) poysonous; so that they constitute ar it were a certain peculiar kind of Feavers, proper indeed to men, but after another manner, than Porphyrius has assigned; for it happens for every man only, and once to be distempered with the Small-pox or Measles: if perchance any one lives free their whole life, or another more often fall into these Distempers, they are rare and unusual events of Nature, which lessen not common observation; yea tis fully confirmed, to wit, that all, and only men are obnoxious to the Small-pox and Measles, and are wont to be rid of them at one sickness. Concerning the Small-pox, we will treat of them apart from the Measles, what the cause of them is, then what signs and symptoms they have, and lastly what things belong to the Crisis and Cure.

Concerning the Causes, we ought to consider in the first place, what is the secret leading Cause, to wit, which renders only and all mankind, and that once, obnoxious to this Disease. Secondly, we will inquire concerning the evident Causes, *viz.* by what and how many ways, this latent and occult disposition, is wont to be, now sooner now later, deduced into Act. Thirdly, it shall be declared, what is the conjunct cause, to wit, by what motion and alteration of the Blood, the figure of this Disease is produced.

1, As to the first, this disposition or Natural predispositon, which inclines human kind to this Disease, seems to be a certain evil or impurity of the Blood, conceived in the Womb, among the first Rudiments of Generation; almost all Authors, would have this ascribed to the Menstruous Blood: which Opinion seems not altogether improbable: because in a womans Womb, (otherways than in most other living Creatures) there is generated a certain Ferment, which being communicated to the mass of Blood, affords to it vigour and spirit, and then at set periods, procures a swelling up, and an excretion of the superfluous Blood; but at the time of Conception, when the *Menstrua* wholly cease, very much of this ferment is bestowed on the *Fætus* or Child; and its Particles, being Hæterogeneous to all the rest, as a certain extraneous thing, are confused with the mass of Blood and humors; with which being involved and separated one from another, lurk or ly hid a long while; yet afterwards, at some time, being moved or stirred up, by some evident cause, they ferment with the Blood, and induce to it an ebullition, and then a Coagulation; from whence very many symptoms of this Disease arise.

These fermentative seeds somtimes are few and gentle, and so involved with other little Bodies, as they do not easily appear, and are brought into act; somtimes they are more and stranger; so that on the least occasion they are ripened into this Disease; hence indeed some are taken sooner, with the Small-Pox in their tender years: others more slowly, and not till full or more ripe age: also some easily receive the contagion, but others converse often with the sick without danger. The sooner that any one hath this Disease, the more secure they are; wherefore children most often escape, old men, or such as are of years, are more in danger, *viz.* in children or young people, transpiration is more easie, also the habit of the Body more firm and healthful. But altho the venomous seeds of this Disease, for the most part are wont to be dispersed or blown away at once, and with one sickness; yet it somtimes happens, that a part of the infection being still left, the sick have fallen into this Disease twice or thrice.

2. The evident cause which stirs up these fermentative seeds, and most often brings them into act, may be said to be threefold, *viz.* The contagion received from some place: the disposition of the Air, and the immoderate perturbation of the Blood and Humors. It is most manifest by daily experience, that this Disease doth come upon others, and spread abroad by contagion; *viz.* from the infected Body, continually flow *Effluvia*,

via, which being received by other Bodies, presently like poyson they ferment with the Blood, and suscitate or awaken the lurking or sleeping seeds of the same Disease, Homogeneous with themselves, and dispose them into the figure or Idea of this Disease: neither is the infection only communicated by contact, but at a distance. They who live within the same house, or neighbouring to the sick, easily receive the infection; also it is cherished in Cloaths, and dissipated afar off, and transferred to more remote places. They who are of kin one to another, sooneſt infect each other: also they who are fearful, and extreamly dread this Disease, more readily fall into it: For by fear, the Particles of the infection are conveyed inwardly from the superficies of the Body. At what time the contagion spreads, and that the Small-pox are Epidemical, all other Diseases almost degenerate into this. Secondly, a certain peculiar dispostion of the Air, notably induces the Small-pox; hence most often it becomes Popular, and rages ordinarily through whole Regions, Cities and Villages; hence also it more often exists in the Spring and Autumn: because at that time especially diverse manners of little Bodies, and by that means tumultuating flow about in the Air, which we draw in with the vital Air, and so various effervescencies of the Blood and Humors, and Ideas of Diseases are raised up, Neither doth this Disease become only more frequent and Epidemical, for these Causes, but also it gets a manifold Nature, that somtimes the Small-pox are deadly, and as it were pestiferous, and somtimes they are more mild and benign; to wit, as they have contracted more or less of malignity from the Air; hence also somtimes black and livid Whelks or Pustils appear, and have much of the Nature of the Plague. Thirdly, somtimes, tho the tinder of contagion be absent, and that no malignant constitution of the Air had gone before, yet by reason of the Blood and Humors being immoderately disturbed, the Small-pox do arise: so I have known some to have fallen into this Disease, from a surfeit, or immoderate exercise, when none besides in the whole Country about, hath been sick of it, to wit, the seeds of this evil, lying hid, without any previous infection, being stirred up by a too great fervor of the Blood, and being associated, gathering together, easily defile, and infect the whole mass of the Blood, with their ferment.

3 So much for the secret leading, and evident causes, but as to the conjunct cause, *viz.* which is the formal reason of this Disease, or the manner of its being made, the business seems a little more intricate. It is commonly wont to be compared to Must growing hot, or Beer when it Purges in the Vat: For if you put to these Liquors, any thing of ferment: as their Particles are Heterogeneous, and of wonderful activity, presently they diffuse themselves through the whole substance of the Liquor, they exagitate the more thick and impure Bodies, against which they are dashed, beat them asunder, and role about them, until a flowring being made, they drive the same from the intimate embrace or company of the Liquor, to the outmost superficies. After the like manner the Heterogeneous seeds of this Disease, are thought to ferment the Blood, and then by a certain eruption of Whelks or Pustles, like the flowring, purifies it. But indeed, if we should more strictly consider the business, there will appear here a great difference: because the infection of the Small-pox, is as it were a ferment, but corruptive, and compels the Blood to grow hot, not towards perfection, but depravation; for when the Particles of this venomous infection strike against the receiving subject, they presently raise up little Bodies like to themselves, and born with us, with which being associated, they pass through the whole mass of the Blood, and make it to grow highly turgid, and to boil up, and after some time growing fervent, to go into parts, and to be coagulated, *viz.* the dispersed seeds of the Poyson, dissolve the mixture of the Blood, presently profligate the more pure Spirits, then they joyn its more thick Particles to themselves, and by their adhesion, render them as it were congealed: The portions being so coagulated, together with the infolded seeds of the poyson, being left by the rest of the Blood, in its circuit, between the extremities of the Vessels, are affixed to the skin: by which means, if Nature being strong enough, doth cast forth the whole poyson, with the congealed Blood, the remaining mass of the Blood, altho made poorer, remains however in a condition to continue life and health: but if the Blood, being too excessively congealed, cannot be purified after this manner; or if portions of the Blood growing together with the poyson, do not fully break forth, or at last do stagnate within, they wholly corrupt the Liquor of the Blood, or else being affixed to the Viscera, and especially to the Heart, they destroy their constitution and strength.

Portions

Portions of the congealed Blood, with the poyſon, begin to break forth about the fourth day, (now ſooner now later:) becauſe coagulation is not preſently induced, but after ſome time, in which the venom unfolds it ſelf, and ferments the Blood with its effervency: Firſt, light portions of the infected Blood, and thoſe but few in number, like to Flea-bites, are fixed in the skin: quickly after more appear, and thoſe firſt broke forth, by the acceſſion of new matter, and by the continual appulſion of the congealed Blood, increaſe and are elevated into a tumor: then theſe whelks at firſt red being by degrees increaſed, at length grow white; *viz.* the Blood being thruſt forth of the Veſſels with the poyſon, by reaſon of the heat and ſtagnation, is changed into matter: about the ſeventh day after the eruption, the white tumors grow crufty, into a dry ſcab; for the more thin part of the matter being evaporated, the reſt grows hard, which then having eaten, and broke off the Cuticula, or outward thin skin, falls away from the fleſh or next skin.

When the infection of the Small-pox, is at once impreſſed on the Blood and Spirits, it very rarely can be blotted out, or diſſipated by Medicines, or blood letting; but that its hidden diſpoſition, will break forth into act; wherefore at firſt it diffuſes it ſelf by little and little, and inſpires the maſs of Blood, as it were with a ferment, hence an ebullition and growing hot are produced in the whole Body, the Veſſels are diſtended, the Viſcera provoked, the membranes pulled, until the ſeeds of the contagion, by fuſing and coagulating the Blood, being at length involved with its congealed portions, are thruſt forth of doors. The eſſence of this Diſeaſe will be better laid open, if that I ſhall recount the ſigns and ſymptoms, which are to be obſerved in its whole courſe, and ſhall add in order the reaſons and cauſes of them, on which they depend: but they are thoſe which either indicate the Diſeaſe being preſent, or that foretel its ſtate and event.

As to the Diagnoſis of this Diſeaſe, by which it may be known, whether any one at firſt falling ſick, will have the Small-pox or not; at that time are to be conſidered, the force of the contagion, and the concourſe of the ſymptoms firſt appearing; for if by reaſon of the evil conſtitution of the Air, this Diſeaſe doth ſpread abroad every where, none then is taken with a Feaver, without the ſuſpition of the Small-pox, eſpecially if they never had them before in their lives; but if this Diſeaſe be more rare, and without fear of contagion, yet its unlooked for aſſault quickly betrays it ſelf, by theſe ſort of ſigns and ſymptoms.

1. There is a wandring and uncertain Feaver, ſomtimes ſtrong, ſomtimes more remiſs, obſerving no reaſon of increaſe, or growing continually hot, ſo that the ſick are now highly hot, by and by without any evident cauſe, they are without a Feaver; the cauſe of which is, for that the fermentative ſeeds are not agitated by an equal motion, but like fire half choaked, now increaſes more, and now are almoſt quelled, and ready to expire; until the burning ſpreading more largly, the flame every where breaks forth.

2. A pain in the Head, and Loins, is ſo peculiar a ſign in this Diſeaſe, that it almoſt alone, in a continual Feaver, ſignifies the approach of the ſmall-pox: the reaſon of which is commonly imputed, to the greater Veſſels being very much diſtended, by the effervency of the Blood: but indeed it appears not, wherefore the ſame trouble is not cauſed equally in other parts, by reaſon of the like diſtention of the Veſſels, and wherefore in the ſmall-pox, more than in a burning Feaver, or in other Feavers, where the Blood grows more hot, theſe kind of pains ſhould increaſe; yea, it may be obſerved, that great pains, now in the Head, now in the Loins, do urge, when the Blood but little ſwelling up, the Veſſels are not amplified, *viz*, in the beginning of the Diſeaſe, when the Feaveriſh diſtemper is not yet conſpicuous, whilſt the ſick as yet goe abroad, and are well in their ſtomach, upon the firſt coming on of the ſmall-pox, they betray themſelves by theſe kind of pains. Wherefore, the cauſe of theſe kind of dolorific pains, ſeems rather to ſubſiſt in the nervous ſtock, *viz.* in the Brain, and ſpinal marrow, and that by reaſon of the membranes, and nervous parts being pulled or hauled, by the particles of the Poyſon, theſe pains do ariſe. For it is moſt likely, that the innate ſeeds of the ſmall-pox, are chiefly hidden in the Spermatick parts, and that firſt of all, the Contagion lays hold on, for the moſt part, the animal Spirits; hence, the firſt effervency is ſtirred up in the juice, wherewith the Brain, and nervous parts, but eſpecially the Spinal marrow are watered, and from thence the evil is Communicated to the maſs of Blood; wherefore, this Diſeaſe beginning, the Head and Loins are tormented with cruel pain; afterwards, the venom being tranſlated into the Blood, the Feaveriſh effervescency is ſtirred up in the whole.

3. Great

3. Great anxiety, and unquietneſs, and ſomtimes a ſwooning, infeſt the ſick, *viz.* by reaſon of the perturbed motion of the Blood, as alſo its equal mixture, beginning to be ſolved, by the Poyſonous ferment, the Blood from thence being apt to ſtagnate in the Heart, and to be hindred in its Circuit, cauſes theſe affections to be thus excited.

4. Cruel Vomiting, alſo when the Ventricle is free from an impure ballaſt of humors, very often accompanies this Diſeaſe; the reaſon of which is, becauſe the fermentative ſeeds, being ſtirred up into motion, by the little Arteries gaping into the Coates of the Ventricle, are depoſed by every appulſe of the Blood, and raiſe up Vomiting, as if the particles of ſtibium had been ſwallowed; but afterwards, aſſoon as ſweating being procured, the Poyſon is driven forth outwardly, this Symptom ceaſes, and the ſick are well in their ſtomach, without any purging forth of the noxious matter.

5. With theſe may be ranked, the Symptoms which ſhew themſelves, according to the various habitudes of the Body, after a diverſe manner, as heavy ſleepineſs, terrors in ſleep, deliriums, tremblings, and convulſions, ſneezing, heat, redneſs, a ſenſe of pricking over the whole Body, involuntary tears, a ſparkling and itching of the eyes, a tumor or ſwelling up of the face, a vehemency of Symptoms from the beginning, that the Diſeaſe ſeems preſently to have attained its ſtrength: the reaſon of all which, may eaſily be elucidated, if what hath been already ſaid, concerning the Symptoms of Feavers, be obſerved; with reſpect to the diverſe tempers of the ſick, their habit, and age, as alſo the condition of the year.

2. As to the Prognoſis of this Diſeaſe, by the Symtomatick ſigns, it is indicated to be either ſalutary, or mortal, or of a doubtful Event.

1. The buſineſs promiſes well, when this Diſeaſe has benign circumſtances; to wit, when it happens in a good conſtitution of the Air and Year, at what time the ſmall-pox are leſs malignant and peſtilential; as in the year 1654, at *Oxford*, about Autumn, the ſmall-pox ſpread abundantly, yet very many eſcaped with them: but before, in the year 1649. this Diſeaſe was more rare, yet moſt dyed of it. Alſo, there is leſs danger, if it ſhould happen in the age of Childhood, or Infancy, or in a ſanguine temper, and good habit of Body, or in a Family, to whoſe Anceſtors, the ſmall-pox have not proved mortal: Beſides, if in the whole courſe of the Diſeaſe, the Symptoms prove laudable, if in the firſt aſſault, there be a gentle Feaver, without cruel Vomiting, Swooning, Delirium, or other horrid Diſtempers; if the Feaver about the fourth day be allayed, with the Symptoms chiefly urging, and then ſome little red ſpots begin to appear: if on the ſecond day, of the coming forth of thoſe little red ſpots, they become more conſpicuous, which afterwards grow together by degrees into little Pimples, and are ripened into matter; if about the tenth day, or thereabouts, after the eruption, the white tumors begin to ſcab, and by little and little from thence to fall off: if after their firſt coming forth, the ſmall-pox are ſoft, diſtinct, few, round, ſharp pointed, lying only towards the skin, and not in the inward parts, you may be confident the ſick will do very well, and is in a good condition.

2. The appearances, which in the ſmall-pox, ſignifie the buſineſs to be ſuſpected, and full of danger are of this ſort: if there be a malignant conſtitution of the Air that this Diſeaſe becomes Peſtilential, and that many die of it: if men of more ripe years, or middle age, be taken with it; if it happens in a cold and melancholick temper, or in an impure or evil humoured Body, where the Blood is not rightly circulated, nor tranſpiration truly performed; or if the Hypochondria, or Precordia are obſtructed, ſome of the Viſcera infirm, or troubled with an Ulcer, or if the habit of the Body be too fat, the ſmall-pox happen not without great danger of life; nor is it leſs to be feared, when preſently after the beginning, a great Feaver, cruel Vomiting, Swooning, a dejection of ſtrength, Phrenſie or Delirium, come upon them, and that theſe deſiſt not, upon the full coming forth of the ſmall-pox, for theſe ſignifie a too great perturbation in the Blood and humours; alſo, a confuſion and contumacy of the morbifick matter, which can neither be ſubdued, nor eaſily ſeparated from the maſs of Blood, or equally extruded from it: if there be an anxiety, and great unquietneſs, with an inordinate boyling up, and growing hot of the Blood; alſo a great thirſt, a difficulty of breathing, alſo a flux of the Belly, or Dyſentery, they ſhew that ſweating is hindred, and that the malignant humours, reſtagnate towards the inward parts: The ſmall-pox breaking forth ſlowly, argue the crudity, and untameableneſs of the matter, and the impotency of Nature, and tis much more a ſign, if they come forth double, and continued, in too exceſſive a quantity, and confuſion, and alſo if there

there be a disordered expulsion, and irregular, of that matter, when not in certain issues, but every where undistinguishable. The pox being hard, signifie the incoction of the same matter, being depressed, a weak expulsion; and they are the worse, if in the midst of them appear black spots; or if purple spots familiar to the Feaver, or the Plague, are sprinkled among the pox, they indicate a great malignity, and putrefaction of the Blood, such as is wont to be found in the Pestilence. Lastly, the pox being black, livid, or green, are of an evil omen, because, besides the coagulations of the Blood, they argue its deadlinesses, and corruptions, as in a Gangreen, or pestilent Plague sore; if when the small-pox being come forth, they presently grow dry, and the swelling of the parts remit, it shews a going back of the malignant matter, or of the congealed Blood, with the Poyson, and a restagnation of it to the inward parts; from whence, unless a more free Diaphoresis or sweating be excited, that it may be thrust forth of doors again, death for the most part quickly follows: For from hence, the Blood being more coagulated, enters into putrefaction, also it is apt to be hindred in its motion, and to stagnate in the heart, and Vessels. If after the coming forth of the small-pox, a flux of the Belly, or a Bleeding at nose, comes upon them, it is an evil sign, because, by this means, the Venom driven outwardly, is again called back inwardly; but somtimes I have observed these Symptoms to have hapned, with great ease to the sick, *viz.* Nature being before oppressed, and burthened; after this manner, part of the burthen being as it were detracted, she was eased; wherefore, she buckled her self to the work of sweating, and more readily expedited the expulsion of the noxious matter.

As to the Curative part, since the stadium or course of this Disease, hath three seasons, as it were so many measures, distinct one from another, the Curative intentions ought to be accommodated to each of these; wherefore the Curative method concerning the small-pox, teacheth first, what is to be done so long as the Blood boyles up, and grows hot inwardly, with the motion of the fermentative matter, and before the small-pox appear, which period for the most part is finished, in four or five days.

Secondly, what means or manner of Dyet and Physick is to be instituted, after the coming forth of the small-pox, until the state or standing of the Disease, *viz.* whilst the whelks or pox come to the height, and being fully suppurated or ripened, begin to dry. Thirdly and lastly, what we must observe in the declining of the Disease, even whilst the small-pox growing dry, fall off.

1. As to the first, let the intention be, that we may carry away every impediment of Nature, whereby the Blood being infected by the ferment of the Small-pox, and apt to be coagulated, may yet retain an equal motion in the Heart, and without stagnation in the Vessels, and growing hot, may expel forth of doors the congealed portions with the Poyson; in the mean time, there must be a caution, least the work of fermentation or growing hot be any ways hindred, or too much provoked; for by this, the mass of the Blood is agitated into congealed portions, more than it ought to be; by that other, it is restrained too much, in its motion, nor are the invenomed Particles sent forth of doors, with the congealed Blood; Nature in the work of secretion and expulsion, is wont to be hindred, by too great an heap of excrements in the Viscera, or by the abundance of Blood in the Vessels; wherefore, upon the first assault of the Disease, care must be taken, that if need be, an evacuation by Vomit or Stool, be timely procured; but only more mild Purges, and gentle, are to be used, which do not too much provoke, or disturb the Humors: wherefore, at this time, Purges, Emetics, or Clysters, now these, now those, take place; also the letting of Blood, if there be a fulness, is performed with good success.

During this growing hot of the Blood, dyet ought to be instituted slender and moderately cooling, *viz.* Barly-Broth, or Grewel of Oatmeal, Posset-drink, Small Beer or the like: Flesh, and Flesh Broths are to be avoided, whereby the Blood, by reason of the too great plenty of Sulphureous Food, may be inkindled more than it ought; also all cold, and sharp or acid things are hurtful: for these congeal the Blood more, and contract the little mouths of the Vessels, by their astriction or binding Nature, that the Small-pox come forth less freely; also hot things, and Cordials are cautiously to be administred, for by these the Blood and Humors are too much agitated, and driven into confusion.

2. When the Small-pox begin to appear, there are three things, which by a constant Rule we prescribe to be performed, to every sick person; to wit, that a soft and gentle Sweat be still continued in the Blood; also, that the Throat and Eyes may be preserved, from a too great eruption of the Small-pox. That the Blood lightly growing hot may emit the Small-pox, decoctions of Figs, Marigold flowers, and shavings of

of Harts-Horn in Poſſet-drink, are commonly preſcribed, and the uſe of them is general for a long time, almoſt with all people; for the ſame intention, we are wont ſomtimes in a day, to give them moderate Cordials; but the more hot and ſtrong are carefully to be ſhunned; Purging and Blood letting here are moſt wickedly enterpriſed, and theſe, tho neceſſity compelled, Phyſicians dare not meddle with for fear of blame: For to defend the Throat and Gutteral parts, we put on the outer skin, a defence of Saffron dipped in Breaſt Milk, and ſowed in a Rag; for theſe, by opening the pores, draw away the venom outwardly, from the moſt inward part of the Throat; alſo for this end, we adminiſter Gargariſms, and things to waſh the mouth, which by their reſtriction, reſtrain the coming forth of the Small-pox withing: we defend the Eyes, with peculiar Medicines, of Roſe-water, and Breaſt Milk, with Saffron, and ſuch like, frequently iterated, from the incurſion of the Small-pox: Beſides theſe, ſometimes certain moſt horrid ſymptoms do trouble, which muſt be timely helped with convenient Remedies; ſomtimes there are preſent, Watchings, Phrenſie, Bleeding at Noſe, Vomiting, Looſneſs, and a falling back of the Small-pox: for theſe and divers others, as occaſion ariſes, a prudent Phyſician knows how to provide; in which however there is need of great caution, leaſt whilſt we take care of the ſmaller matters, the great work of Nature ſhold be diſturbed by a too great moleſtation of Medicines. For in all this time there is one, and a coutinued Criſis: wherefore nothing is to be meddled with raſhly. There is required the moſt care and circumſpection of the Phyſician and Nurſes, or thoſe that adminiſter to the ſick, when this Diſeaſe is at its height or ſtanding, *viz.* leaſt that when the Small-pox be fully come forth, and brought to their greateſt height, tranſpiration ſhould be hindered; for then the ſick are in danger of renewing the Feaver, and of the reſtagnation of the Malignant matter within, whilſt we ſtudy to prevent the one, we for the moſt part bring on the other.

3. When the Diſeaſe ſhall be in its declination, and the Small-pox begin to wither and Scab, the buſineſs for the moſt part is out of danger, nor is there much need of a Phyſician: let the ſick, tho he grow very hungry, content himſelf ſtill with a ſlender dyet, and without fleſh: if the Scabs fall off ſlowly, we are wont to ripen them with Lineaments, and peculiar Medicines, to make them fall, and care ſhould be taken that they leave not behind them too great pits: after the ſick having the Scabs every where fallen off, and are able to riſe and walk about the Chamber, the filthy Excrementitious matter in the Bowels, is to be carried away, by two or three times Purging, and then they may be permitted to uſe a more plentiful and ſtronger dyet.

The Meaſles are ſo much akin to the Small-pox, that with moſt Authors, they have not deſerved to be handled apart from them, but that either diſtemper have been treated of together, after the like manner and method. The eſſence and cure differ at leaſt accidentally, or as they are greater or leſſer; becauſe in the Meaſles the whealks riſe not up to ſo great a bulk, neither are they ſuppuritated; wherefore the ſickneſs is ſooner ended and with leſs danger. This diſtemper is wont moſtly to ſpread upon children, more rarely among thoſe of years, or old men, alſo thoſe who firſt have had the Small-pox, are not afterwards ſo obnoxious to the Meaſles, but in moſt things, either diſtemper are of kin, *viz.* the evil being contracted in the Womb, diſpoſes men only, and all men once, to the Meaſles; the malignant conſtitution of the Air, and ſomtimes a ſurfeit, and moſt often the contagion, are wont to bring the hidden diſpoſition into act: there are preſent marks of malignity, and the ſickneſs oftentimes becomes Epidemical, and with mortality and contagion.

That I may briefly contract the ſum of the matter: it ſeems that the Meaſles are a certain lighter flowring, of on extraneous ferment, contracted from the Womb; by which, ſome Particles being ſtirred up into motion, make the Blood lightly to grow hot, and to be a little coagulated: wherefore the marks from thence ſpread abroad, are diſſipated without any breaking of the Cuticula, or outward skin, by evaporation only: but the Small-pox are a more full and ſtrong agitation, according to all the Particles of the ſame ferment, which cauſing a greater ebullition and coagulation of the Blood, produces far more full whelks, and greater in bulk, and not to be diſſolved, but by ſuppuration, or growing into matter: when the Small-pox preceed, they are not only exempt from the ſame diſeaſe any more, but alſo from the Meaſles, becauſe they conſume only ſome of the Particles of the ferment, leave ſtill a diſpoſition to the Small-pox; wherefore old men, or thoſe of years, are not ſo readily infected with the Meaſles, becauſe they are either freed from the contagion, by having before had the Small-pox, or elſe the infection of this more light Diſeaſe, is eaſily reſiſted by their more ſtrong Spirits.

It were eaſie to illuſtrate the afore-recited Doctrine, concerning the Small Pox, with Hiſtories and Obſervations of the ſick, becauſe there is no Diſeaſe beſides can ſupply with a greater plenty of Examples, or variety of Accidents: but of the great number of this kind, I ſhall only propoſe in this place a few Caſes, and thoſe remarkable for ſome irregularities.

It is a uſual thing to handle all that are ſick of the Small Pox, with a like, or wholly the ſame method of Curing, and manner of Dyet; wherefore, a Phyſician is rarely ſent for to the common ſort, but the buſineſs is wholly committed to ſome women, profeſſing themſelves skilful in this Diſeaſe: and theſe are wont to boyl in their broths, and all the ſuppings of the ſick, Marigold Flowers, ſhaving of Harts-horn, and ſometimes Figs; alſo every night to adminiſter a Bolus of Diaſcordium: and they who grow not well by this kind of Government, tho not neglected, yet are affirmed to be incurable, by reaſon of the cruelty of the Diſeaſe. But truly this kind of practice is not convenient for all alike, nor to be adminiſtred to every one indifferently, as theſe two following Hiſtories will make manifeſt.

A Young Man, about 20 years of Age, of a ſlender body, and more hot temperature, began to be feaveriſh in the beginning of the Spring, at firſt cruel Vomitings, an oppreſſion of the heart, and frequent changes of heat and ſhivering, a pain in his Loyns, a diſturbance of his fancy and wakings infeſted him: on the third day, the Small Pox appearing, thoſe ſymptoms remitted, but ſtill the Feaver, with heat and thirſt continued. Not only the accuſtomed Decoctions in this Diſeaſe, but alſo a moſt elegant Julep, of a moſt grateful taſte, were ſo nauſeous and troubleſome to him, that he would not ſo much as taſte the ſame, but with a great deal of trouble: as often as he took going to ſleep, Diaſcordium, or any other more temperate Cordial, for the continuing his ſweat, tho in a very little quantity, the night following he was without ſleep, and in great diſquiet; and then in the beginning of the morning a bleeding followed, by which means, indeed, the Small Pox being full come forth, the Life of the ſick was in great danger, by reaſon of this occaſion happening once or twice; wherefore, when I had found by obſervation, his blood apt to grow immoderately hot, by ſo light a provocation, I inſtituted this method as occaſion ſerved. All Medicines being let alone, he took for the quenching his thirſt ſmall beer, and ſimple Almond Drink, at his pleaſure: for his food, becauſe he vomited back all Oatmeal Grewel, or Barly Broth, he eat only apples roaſted tender, and dreſt with ſuggar and roſe water, often in a day. Nature being contented with this ſlender ordering, and being ſeen to be diſturbed with any other thing, performed happily its work, that the ſick perſon grew well, without any grievous ſymptom afterwards, the Small Pox from thence ripening, and then of their own accord falling off.

In the middle of the Autumn, of the former Year, a Gentile Young Man, being indued with a ſharp Blood, and obnoxious to a frequent bleeding at Noſe, fell ſick of the Small Pox; his Blood of its own accord grew immoderately hot, that the whealks very quickly broke forth over all his Body: Poſſet Drink, with Marigold Flowers, and other uſual things boyled in it, alſo Juleps, or any Cordials, tho temperate, and gently provoking ſweat, moſt certainly ſtirr'd up a Flux of Blood in this Perſon; wherefore I ordered the like manner of Dyet, as in the ſick Perſon before cited, by which he found himſelf better; however, in the very ſtate or ſtanding of the Diſeaſe, (when the Small Pox being fully come forth, by reaſon of a more difficult tranſpiration, the Feaver is wont to be ſomewhat renewed in all) this ſick Man fell into a moſt plentiful bleeding; that after a large profuſion of Blood, the Small Pox began to flagg or fall: After that Remedies, very many, were tryed in vain, for the ſtaying of the Blood, at length a little Bag being hung about his Neck (in which was a Toad dryed in the Sun, and bruiſed) he firſt, and immediately perceived eaſe; tho the bleeding was by this means ſtayed, and not any more returning, (whilſt he conſtantly wore this peculiar Medicine in his Boſom) our ſick Man ſtill uſing a moſt thin and cooling Dyet, grew quite well; that indeed from hence it may appear, that altho the Blood in this Diſtemper, is apt to be greatly coagulated, yet ſo long as the Vital Spirits being ſtrong and robuſt, are able ſufficiently to execute their government, they indeavouring by their proper ſtrength or forces, do beſt of all ſeparate and thruſt forth the congealed portions of the Blood, as it were by a certain skilful ſeparation; and this work is moſt of all hindred, when the ſame ſpirits are too much irritated by Cordials, or more hot food, and agitated into confuſion: But in the Plague it happens otherwiſe, becauſe in this, if any delay be granted, the Spirits themſelves are

preſently profligated by the venom; wherefore, here they muſt fight cloſe and quick, when in the Small Pox, the Phyſician does his buſineſs better by delay.

Concerning letting of Blood, at the inſtant breaking out of the Small Pox, it is very dubious: formerly, among our Countrimen, this was eſteemed a wicked buſineſs, neither were they wont to admit of Phlebotomy under any pretext of neceſſity: but of late, experience having taught us, in ſome caſes, it is found, that to let Blood hath been wholly profitable and neceſſary; which evacuation however, if it ſhould be adminiſtred indifferently in every conſtitution, or when this need ſhould be, it ſhould be performed in too large a quantity, by that means oftentimes very great damage ariſes.

Some years before, I viſited a young Gentlewoman, of a florid countenance, and more hot temperature, growing into a Feaver, after the fourth month of her being with Child: ſhe was troubled with a cruel vomiting, a moſt cruel pain of the Loyns, beſides with moſt ſtrong heat and thirſt: her pulſe was ſwift, with a ſtrong and vehement vibration or beating: altho the Small Pox had never been in that place, yet theſe ſymptoms gave no light ſuſpicion of this Diſeaſe; however, its great effervescency indicated that Blood ſhould be taken away; wherefore I took away about ſix ounces preſently, upon which the heat remitted ſomwhat, yet the vomiting, with a cruel pain in the Loyns, remained ſtill: At the hour of ſleep I gave her a Cordial Bolus, with half a grain of our Laudanum, by which means quiet ſleep followed, with a pleaſant ſweat, and an allaying of all the ſymptoms: the next morning the Small Pox came forth, with which, altho the ſick Gentlewoman was greatly diſtempered, yet ſhe grew well without any dangerous ſickneſs, or fear of miſcarrying, and went out her full time.

The laſt Autumn, a ſtrong Man, of an active and robuſt conſtitution of body, yet of a pale countenance, and more cold temper, fell into a Feaver: on the ſecond day he was tormented with heat and thirſt, and a moſt cruel pain in his Loyns: when I had preſcribed Blood to be taken in a ſmall quantity, the unskilful Chirurgion, who was ſent for, took from him almoſt half a pound; a little after, the ſick man began to be all over in a cold ſweat, on a ſudden to looſe all ſtrength, to be troubled with a ſhivering, a weak Pulſe and unequal, and frequent ſwooning: At this time being ſent for, I gave him a temperate Cordial, to be taken frequently. His Spirits and Pulſe being thereby reſtored, the Feaver was renewed, which afterwards, for ſome days, yea, weeks, exerciſed the ſick man, after a very irregular manner; for he was wont for three or four days, to grow very hot, alſo to be infeſted with thirſt, watchings, headach, and other ſymptoms, then to be troubled all over with a copious and critical ſweat, by which indeed for half a days ſpace he found himſelf better: But from thence, the Feaver ſtill growing worſe, heaped together again new matter, till it was diſperſed by another Criſis, and then another. After that he had been thus feaveriſh, for at leaſt twenty days irregularly, at length the Small Pox began to come forth, in ſeveral parts of his Body, here and there, and then the Feaver wholly remitted; yet within few days, by reaſon of ſome errors committed in his Dyet, very many of the whealks began to fall down again, few of them only being brought to maturity: However, inſtead of the ſubſiding Small Pocks, a mighty Bubo grew up behind his right Ear; from which, being ſoon ripened, and broke, a great plenty of matter flowed forth for many days, and ſo at length the corruptions of the Blood, unable otherways to be diſſipated, were carried forth by degrees, and the ſick Perſon recovered perfect Health.

CHAP. XVI.

Of Feavers of Child-bearing Women.

VUlgar Experience abundantly teſtifies, that the Feavers of Women lying in are very dangerous, beyond the diſpoſition of other common Feavers: alſo that the ſame differ very much, as to their eſſence, from both a ſimple and putrid Synochus, plainly appears from their ſigns and ſymptoms rightly weigh'd: wherefore, I believe it not to be from the matter, to handle after malignant Feavers, the acute Diſeaſes of Women lying in, being exceeding neer of kin to thoſe, for their mortality or perniciouſneſs. Yet, before I ſhall enter upon the unfolding theſe Diſeaſes, it behoves us to conſider their ſubjects, *viz.* the Bodies of Women in Child-bed, after what manner they are prediſpoſed, and by what proviſion they are made obnoxious to theſe kind of ſickneſſes.

Concerning this, the firſt thing that offers itſelf, is, that the Flux of the menſtruous Blood, is wholly convenient to be ſuffered by human kind, and at this time for Women, concerning whoſe nature and original we ſhall not inquire in this place; but it ſhall ſuffice to note, that in them, the particles of the Blood, to be periodically thruſt forth, are very Fermentative; which, if reteined in the Body, beyond the wonted manner of Nature, are very often the cauſe of many Diſeaſes: unleſs only when a Woman conceives with Child. For all the time of her being big Bellied, the monthly Flowers are ſtopped without any incommodiouſneſs; and in the mean time, milk, or the alible juice, is diſpoſed in great plenty, about the parts of the Womb, for the nouriſhment of the Child: but after the Birth, this daily ſuppreſſion of the monthly Flowers, is recompenſed by a copious flowing forth of the Lochia, or what comes away after the Birth; and the milk within three days having wholly left the Womb, ſprings forth plentifully into the Breaſts: at which time, Women lying in, are wont to be troubled with a ſmall Feaver. If that the milk be driven away from the Breaſts, it reſtagnates again towards the Womb, and is thruſt forth, together with the Lochia, under the form of a whitiſh humour. In the mean time, the Womb, after the Birth, becomes ſubject to various diſtempers; for oftentimes, its tone is hurt, the unity is diſſolved, and many other accidents are induced, which render Women lying in ſubject to danger: wherefore, that their acute Diſeaſes may be rightly unfolded, it is convenient, for to conſider chiefly theſe three things, *viz.* firſt, the nouriſhment of the Child, or the Generation of Milk, both in the Womb, and in the Dugs, and the metaſtaſis or tranſlation of it from one to another. Secondly, the purging of the Mothers Blood, or the profluvium of the Lochia, after a long ſuppreſſion of the Menſtrua. Thirdly, the condition of the Womb after the Birth, and its influence on other parts of the Body. And theſe being premiſed, we will ſpeak of the Feavers of Women lying in, *viz.* both the milkie, and the putrid, called, and that deſervedly, malignant, by reaſon of its deadlineſs.

Firſt the Milk, and nouriſhing humour, being heaped up in the parts of the Womb, for the nouriſhment of the Child, are of a like nature, tho ſomewhat different in conſiſtency. Milk is indeed more thick, becauſe it ought to be received in at the mouth, and to be kept in the Ventricle, and afterwards it more thin portion to be conveyed to the maſs of Blood. The other alible Juice is more thin, and like the water of diſtilled Milk, becauſe 'tis immediately poured into the Blood of the Embryo, thorow the umbilick Veſſels, without any previous digeſtion. Either Juice is ſuppoſed to come from the Chyle freſh made in the mothers ſtomach; what is repoſed, or laid up in the Breaſt, is more thick and white, by reaſon of the more thin or open ſtrainer, and coction in the greater Glandulas; on the contrary, it happens in the Womb otherwiſe, where the Glandulas are ſmaller, and the Straining more cloſe. But there is a great diſagreement among Authors, concerning the paſſages, by which this humor is carried, both in the Breaſts, and into the Cake of the Womb. Some contend, that Milk only is begotten of the Blood, more plentifully cocted in the Glandulas, which yet, by reaſon of the immenſe diſpenſe of Milk, which conſiſts not with the Blood, this ſeems not probable. Others affirm, that the Chyle, or Milkie humor, is

is immediately conveyed from the Viſcera of Concoction, thorow occult paſſages, without any alteration, into either receptacles. But in the mean time, while theſe paſſages lie open, it ſeems indeed to me more likely, that from the meat taken into the Mothers Stomach, a portion of the Chyle thence made, is preſently ſupped up into the Veins, which having obtained the vehicle of the Blood, before it be aſſimilated by it, is laid up in the Glandulas, deſtinated here and there for the receiving of it, being carried by the Arteries, and laſtly ſeparated from the maſs of Blood; for as it appears, that drink being plentifully taken, preſently paſſes thorow the whole maſs of Blood, and is rendered by Urine like water: and as old Ulcers, by means of the Blood coming between, prey upon the nutritious humor, from the whole Body, and pour it forth under the ſhape of a putrified matter, Why may not the alible Juice in like manner, being ſtrained by the Collander of the Glandulas, before it has indued the colour of Blood, go into a Milkie humour? This indeed ſeems more probable, becauſe, whilſt the Milk is carried from the Womb into the Breaſts, and on the contrary, paſſing thorow the maſs of Blood, it is wont to ſtir up a perturbation thorow the whole, with a feaveriſh intemperance; beſides, in the firſt days, after the Birth, when the Glandulas do leſs rightly perform the office of ſecretion: Beaſts, who have not the Lochia, give a bloody Milk, which is drawn forth of their Udders, that is, mixt with Blood, by reaſon of the plenty of it flowing forth together.

Secondly, As to what belongs to the Menſtrua being ſuppreſſed, in the time of being with Child, and the Lochia plentifully coming away, after being Delivered, we ſay that after the Conception of the Child, the Menſtrua ought to be ſuppreſſed by Divine Deſignation, for that the flowing of them often cauſes abortion; then, becauſe the Veſſels are filled by a continual ſtilling forth of the alible juice into the parts of the Womb, the maſs of the Blood doth not ariſe into ſwellings up, to be allayed by the menſtruous Flux. For the ſame reaſon, Women for the moſt part, have not their courſes ſo long as they give ſuck. Perhaps in ſome, indued with a more hot Blood, the monthly courſes flow, both whilſt they are Big-bellied, and in the time of their giving ſuck, but that more rarely, and is wont not to happen without trouble; yet in the mean time, the Menſtrua being ſuppreſſed, during the time of being with Child, becauſe much leſs of the nutritious humor is expended at that time for Milk, they much more deprave the Blood, than the ſame being reſtrained at the time of ſuckling the Child, are wont to do: yea, from them being long ſuppreſſed, in the former condition, an, as it were, envenomed taint is impreſſed on the maſs of Blood, which, unleſs it be purged forth by the daily Flux of the Lochia, preſently after being brought to Bed, produces grievous, and almoſt malignant Diſtempers. Wherefore, that I may give my opinion of the flowing of the Lochia, I ſay, that this bleeding proceeds immediately from the Veſſels being broken, by which the after-Birth did ſtick to the Womb, and that by this way, the excrementitious Blood and humors, being partly heaped up about the Womb during the time of being with Child, and partly flowing from the whole maſs of the Blood, are evacuated, *viz.* whilſt the Womb at firſt intumified in its bulk, falls down preſently after the Birth, and is contracted into a leſſer ſpace, the Blood is plentifully preſſed forth, from the Veſſels opening into it. But beſides, foraſmuch as during the ſuppreſſion of the courſes, the bloody maſs is imbued with very fermentative Particles, as ſoon as after the Birth, the mouths of the Veſſels are opened, forthwith, as it were at the inſtant of a more large Flux of monthly courſes, the whole Blood grows hot (even as Muſt or new Wine upon the opening the Bottle) and indeavours to purge forth the highly fermentative particles, out of its boſom, by the going away of the Lochia, as it were the flowring: And therefore, beſides the Blood, which in the firſt days, oftentimes flows pure, by reaſon of the freſh opening of the Veſſels, afterwards is ſifted forth matter very much diſcoloured, *viz.* livid and green, and this very ſtinking, This kind of Flux is wont to continue, at leaſt for 14 days, yea, in ſome for a month; and if that by reaſon of any error, it be ſtopped before the maſs of Blood be throughly purified, by ſuch flowring, preſently a Feaver, very dangerous, with horrid proviſions of ſymptoms, is wont to be induced: of which we ſhall ſpeak anon in its proper place.

The third conſideration, previous to the Doctrine of Feavers, belonging to Women in Child-bed, is chiefly about the Womb it ſelf; to wit, how it is affected after Child-bearing, and what influence it has on other parts of the Body. As to the firſt, there are chiefly two accidents, upon which the acute Diſeaſes of Women in Child-bed very much depend, *viz.* Firſt, The falling down of the Womb, or the reduction

duction of it, from the bulk of ingravidation, to its natural site and magnitude: Secondly, the solution of the unity, within its cavity, by reason of the breaking of the connexion, or tying to the cake of it, or after-Birth. When the Child, with what wraps it about, is put forth, presently the sides of the Womb it self, before very much amplified or enlarged, do mutually close, and by the help of the Fibres, leisurely contract themselves into a narrower space; by reason of this kind of contraction, the Blood and Corruptions, or matter, are plentifully pressed forth, from the Vessels and Pores of the Womb, and are thrust forth with the Lochia. But sometimes it happens, by reason of some preternatural things conteined in the Womb, as part of the secondine or after Birth, a Mole or piece of Flesh, clodders of Blood, &c. also, if there happen after a painful Birth, a Contusion or great Dilaceration, that the Womb cannot rightly draw it self together, but by an inverse motion of the Fibres, ascends upwards, and is lifted up into a bulk; also the membranes being affected with a Convulsion, it self is still tormented with torments, as if it were yet in Travel; which kind of Distempers, if they long continue, by reason of the Orifice of the Womb being tied together, with the Convulsive motion, the Lochia are oftentimes stopped also: from hence grievous symptoms follow, and very often the Feaver is either first excited, or it happens, being for some other cause induced, to be rendred far more dangerous. Secondly, as to the solution of the unity, from the cake of the Womb being broken, it comes to pass, that the Birth, either at its just time, or precipitous, being too much hastened; then the secundine is cast forth, either whole, or being torn, or pull'd away, part of it being left behind, it is cut off as it were in half. If the Child be born at its just time, and the Birth, with what inwraps it, comes away from the cavity of the Womb, as ripe fruit from a Tree, whole, and without violence, the mouths of the Vessels are somewhat unlocked, and the Lochia moderately flow; but from hence no grievous symptom is to be feared: but if the Child, not being yet ripe for the Birth, is pulled away, or breaks forth as it were by force, although the Cake, with the membrane is pulled away whole, yet the Vessels being torn, a greater hemorrhage or bleeding, and at length an Ulcerous disposition follows, the little mouths of the Vessels spewing forth a stinking matter. If that part, or the whole secundine sticks to the sides of the Womb, after the Birth, it there putrifies, and sends forth very stinking matter or corruption, and stirs up wicked distempers: oftentimes the Orifice of the Womb is shut up, and retains within gobbets of clodder'd Blood, little pieces of Membranes, or Flesh, which putrifying, by reason of the heat, impoyson the Blood and humors, flowing together to that place, by Circulation, from the whole body; also, by a troublesome itching or provocation, they stir up the parts of the Womb, being so very sensible, into Convulsions.

When therefore hurt is brought to the Womb, from Child-bearing, after the aforesaid ways, the same is quickly communicated to other parts, not without trouble to the whole body; which thing indeed is wont to be done by a double means. For first, this happens, because the Lochia being hindred from being thrust forth, presently restagnate or flow back upon the mass of Blood, and infect it as it were with a virulent taint: moreover, from the contents putrifying in the Womb, either the substance it self of the matter, or the Particles coming away from the cadaverous substance, are mingled with the Blood, and nervous juice, passing thorow that place, and quickly infect their whole liquors. Secondly, hysterical Distempers, are more largely extended, by reason of the notable consent, which happens between the Womb and the Brain, with the Fibres and Membranes of the whole body, by the means of the nervous passage: for when the extremities of the Nerves, planted about the parts of the Womb, are driven into Cramps and Convulsive motions, by reason of the presence of some hurtful humor, the Convulsions there received, presently creep more largely upwards, by the indeavours and circumduction of the Nerves, towards the Brain; and so it happens to the Viscera to be successively inflated, and cruelly haled together. and the Brain it self at length to be pierced, and its functions to be as it were overwhelmed: hence, from the convulsive motions, arising about the Womb, an inflation of the Belly, and hypochondria, a rumbling, vomiting, sobbing, and streightness of the Præcordia, difficult breathing, a sense of choaking, and oftentimes a stupor, and want of speech, or at least some of these are excited: nor does the Tragedy so easily leave, but that also the Brain being hurt, by the continuance of the distemper, by that means, the evil is retorted upon other parts, that oftentimes the whole nervous stock is compelled into irregularities of motions; For

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what commonly is ſaid to be done by vapours, and the diſtemper, called the aſcent of vapours, creeping from the nether parts, to the upper, is nothing elſe than the parts of the Membranes, and nervous paſſages, being ſucceſſively driven into Convulſions. Further, in theſe ſort of diſtempers, the hurt action doth not always begin, or is at firſt perceived, in that region or place where the hurt is inflicted, neither do the paſſions which are called hyſterical, proceed only from the Womb; for ſometimes, the trouble is immediately brought from the Brain, or the Convulſions and Contractions begin in the extreme parts, and ſometimes the extremities of the Nerves, ſomewhere in the Viſcera, as the Stomach, Spleen, Reins, no leſs than the Womb, are haled; in which, irregularities being ariſen, they are continued into the neighbouring part, and from thence to the Brain: From whence again, the Convulſions are reflected to other parts, and not ſeldom thorow the whole Body. Juſt ſo the buſineſs in Child-bearing Women, and with others in Feavers, as I have often obſerved; to wit, ſome by reaſon of their Womb being evilly affected, but others by reaſon of a Feaveriſh matter fixed in the Brain, by a critical metaſtaſis or tranſlation, fall into paſſions like to the hyſterical. And theſe things being rightly prepenſed, concerning the prævious proviſion, in the Feavers of Women in Child-bed, there is not any thing that we ſhould ſtick at in the entrance more, ſo that we take notice that the bodies of Women lying in, (eſpecially thoſe who are feeble, and of a more tender conſtitution) are debilitated, chiefly after a difficult and hard Labour; ſo that, by reaſon of this occaſion only, they eaſily conceive feaveriſh intemperatures, and being brought in by this or any other means, they are hardly able to bear them. We will next ſpeak of the Feavers themſelves, with which Women Lying in are wont to be ſick, of which Diſtempers there are commonly recounted as it were three kinds, *viz.* the Milkie Feaver, the Putrid, the Symptomatic, or of that manner by a certain borrowed ſymptom, but is chiefly marked with the Pleuriſie, Squinancy or the Small-Pox: of which we will diſcourſe in order.

The Milkie Feaver.

WE have already ſaid, that as yet it was uncertain of what matter Milk was immediately made, and by what paſſages it is carried into the Breaſts, moreover when this part appears not at all to anatomical inſpection, I am of the opinion, that the Milkie Chyme, being made out of aliments in the Bowels, and from thence confuſed to the Blood for nouriſhing juice, is preſently again, for the moſt part of it, ſeparated from its maſs by the help of the Glandulas in the Womb, or in the Breaſts, that it might ſupply the Child with nutriment, either in the Mothers Belly, or in her boſom by the Breaſts. In the time of going with Child, altho the greateſt part of this is derived to the Womb, yet in the laſt months, a little quantity of it is laid up in the Breaſts; but about the third or fourth day, after being brought to bed, the Milk is more plentifully carried into the Breaſts, and as it were with a certain force, that it quickly fills them to a ſtretching them forth, and begins to be troubleſome. At this time, Women lying in (tho not all, yet moſt) are wont to be troubled with a feaveriſh intemperature, with thirſt, heat, and an inquietude of the whole Body, they complain of a pain very troubleſome in the Back and Shoulders, of a fullneſs and burning of the Breaſts; and unleſs the Milk be diligently drawn forth, it being too much congeſted or heaped up, oftentimes brings forth an inflamation, with an Impoſthume following of it in the Breaſts. This Feaver, whilſt the Lochia are in good order, hardly laſts three days, but that about that ſpace it is wont to be allayed, a plentiful ſweating ariſing of its own accord: yet this intemperature being excited by the coming of the Milk, is ſomewhat increaſed and continued longer, if that the Milk entring the Breaſts in abundance, be not milked forth, but is again repelled from thence; for by its departure, as well as by its coming, a perturbation is wont to happen in the whole Body, with thirſt and heat, which alſo more certainly comes to paſs if it happens to be driven away violently, by repelling Topicks. But being driven by their help from the Breaſts, or departing of its own accord, it is thruſt forth, with the Lochia, in the form of a whitiſh humor, and a ſweat, or more plentiful tranſpiration, exterminates the Reliques of the Diſeaſe. If that with this kind of intemperance, brought in by reaſon of the commotion of the Milk, the Lochia be ſtopped, or errors in eating and drinking be committed, or any other evident cauſe ſhould happen, that may encreaſe the fervor of the Blood, very often the Milkie

Feaver

Feaver, presently acquiring worse symptoms, changes iuto a putrid, or rather malignant Feaver.

The cause, or formal reason of the aforesaid Feaver (whilst the way of the Milk lies hid) may be only proposed, from an hypothesis, and as it were a certain Augury; for being supposed, that this milky humor is carried to the Breasts immediately, by a peculiar passage, from the Viscera of concoction, without any commerce with the Blood, this feaverish Distemper arises, for that the Breasts being filled with Milk, and greatly distended, the sanguineous Vessels are so compressed, that they do not easily transmit the Blood flowing thither; from whence, the Blood being hindred in its circuit, begins to tumultuate thorow its whole mass, and the Spirits being inordinately moved, and wholly confused, it conceives a fervor, such as being induced by a stopping, Surfeit, Inflamation, or Wound, constitutes ordinarily the simple Synochus; but if the matter of the Milk (as it is not improbable) passes thorow the Blood, this Feaver of Women in Child-bed, seems to spring from hence, that when this Latex is transferred to the Breasts, having left the Womb, a great portion of it subsists in the mass of the Blood, which indeed, for that it exceeds the due provision of the nourishing juice, and so cannot be wholly assimilated, and besides abounds in heterogeneous parts, and as it were something extraneous, and not mingleable with the Blood, creates a trouble, therefore for the carrying it forth of doors, and putting it forth, this three days feaverish Distemper is employed: For when the milky Chile, being used to be separated about the Womb, by and by, after being Delivered of a Child, that wax of excretion is hindred, restagnating into the mass of Blood, it is there first of all heaped up more plentifully, than that the whole may go into nourishment, or be received into the Breasts: wherefore, the Milk, not only in its passage to the Breasts, but also in its return towards the Womb, brings forth the Feaver, to wit, by reason of either passage thorow the Blood.

But however the cause of this Disease is ordained, it matters little or nothing towards the Cure; for this is wholly committed to Nature, and so long as the Lochia are in good order, it proceeds for the most part happily, without any Physical help: because, after the growing hot of the Blood, for three or four days, either a plentiful sweat, or a more free transpiration, cures this Distemper, to wit, either the Particles of the Milky humor, degenerate in the assimulating, or the adust recrements, remaining after the deflagration of the Blood, or both of them at once supplying the food or tinder of the Feaver, are by little and little subdued, and evaporated out of doors, which being excluded, the Blood becoming free from the extraneous mixture, quickly recovers its pristine condition; yet in the mean time, certain vulgar Rules are wont to be observed, about the admission of the Milk into, or the driving away of the same, out of the Breasts. If the Milk too plentifully springs into the Breasts, that their inflamation, as also the immederate growing hot of the Blood, may be prevented, at that time, a more thin and sparing dyet, to wit, no flesh broths, and also in a less quantity, is to be ordered: also the Breasts are to be frequently drawn. If it be not commodious for the Mother to suckle her Child, it is usual after the first or third day of her being Delivered to cover all the Breasts over with Sear-Cloaths moderately binding (as the Plaister of Red-lead, &c.) for so the spongious substance of the Glandulas, is somewhat constrained, or closed together, whereby they less readily receive the milky humor flowing thither, yet this kind of Remedy ought to be cautiously administred, lest if the Milk be wholly excluded, or driven out of the Breast too abruptly, restagnating suddenly in the Blood, it induces its disorder, the prodromus or forerunner of the Putrid or Malignant Feaver: of which it remains that we speak next.

The Putrid Feaver of Women in Child-bed.

WOmen Lying in, from the fault of an evil affected Body, as by the Contagion of a received Pestilential Air, are found to be too obnoxious to the Putrid, or rather Malignant Feaver; but all do not alike receive the Infection of this sort of Disease; for poor people, Labouring Women, Country Women, and others accustomed to hard Labour, as also Viragoes, and Whores, which are brought to Bed clandestinely, bring forth without any great difficulty, and then, after a little time, leaving their Beds, return to their wonted Labours: But more rich Women, tender and fair, and most living a sedentary life, as if participating after a more grievous manner

manner of the Divine Malediction, bring forth in pain, and then presently after the Birth they are subject to difficult and dangerous chances; the reason of which seems to lie in this, that those who are used to much exercise, continually agitate and eventilate the Blood, and therefore fewer infectious taints from the monthly Flowers being suppressed, do gather together for the matter of a Disease; moreover, laborious and nimble Women, as they have their nervous parts more firm, therefore they are less subjected to convulsive motions, and to the passions commonly called hysterical: on the contrary, in delicate, and idle Women, the mass of Blood, in the time of their going with Child, becomes very impure and fermentitible; besides, because they have the system of the Nerves, and the Brain soft and weak, upon every light occasion, they suffer distractions of the animal Spirits, and inordinate motions of the nervous parts. And here, by the way, it is to be noted, that Women more than men, and that some of the same Sex before others, are sensible of the affections called hysterical, not so much by the default of their Womb, as for that they are of more weak constitution of Brain, and nervous stock; for in those so affected, the passions of anger, sadness, fear, as also all troublesome and more strong objects, easily pervert the dispositions and functions of those parts, which, when they are once hurt for the most part afterwards, are accustomed to those irregularities. But we will return from whence we have digressed. The Feaver but now proposed, is wont to infest Women Lying in, indeed at various times, and by reason of divers occasions, now presently after the Birth, especially if it be difficult and laborious, now it arises in the first, now the second, third, or fourth week; yet the sooner it begins, the more lately it is wont to be cured. The Type or Figure of this Disease, is performed almost after this manner. After a previous indisposition, an open feaverishness, for the most part with a shivering, or horror, constitutes the first assault, which is followed with heat, and afterwards succeeds a sweat: perhaps, for a day or two, they have various reciprocal fits of heat and cold; then the Blood being wholly inkindled, the Lochia, if not before suppressed, either flow smally, or are wholly stopt: If the Disease be acute, and of a swift motion, it comes to its height on the third or fourth day, then an intense heat, with a very troublesome thirst, a vehement pulse, and quick pertinacious wakings, a great inquietude of the whole Body, that they are continually tossing themselves in their Beds hither and thither, a thick Urine, and high coloured, and other most grievous symptoms, are wont to trouble them: whilst the Feaver is after this manner at its height no Crisis is to be expected; for I never saw this Disease cured by a critical sweat, but that the business was still very precipitously acted, as after the Blood was grown hot for a little time, presently the adust matter being translated to the Brain, most dangerous and heavy inordinations of it, and the whole nervous stock forthwith come upon them; for most often are stirred up, convulsive motions of the Tendons, wonderful distentions, and inflations about the Viscera, like to the hysterical passions; then sometimes, also follow a phrensie, or dilerium, not seldom a stupefaction, and speechlessness; the strength is suddenly cast down almost in all, without any manifest cause, the Pulse becomes weak, and unequal; and the sick are suddenly precipitated to death: If that any perhaps escape, either by the return of the Flux of the Lochia, or a Lask, coming upon it, they hardly recover but of a long time: I have known in some, purple spots to have appeared, and certainly in many, symptoms that respect either the Blood or nervous juice, which argue no light Malignity.

We will distinguish the causes of this Feaver, after the ordinary manner, into Procatartic, Evident and Conjunct. Those of the first sort, upon which the malignity, and the greatest perniciousness of the Disease depend, are two, *viz.* first, a depraved disposition of the Blood, from the long suppression of the monthly Flux. Secondly, after the Birth, the evil affections of the Womb, from the dangerous Labours of Women, (who undergo the Divine Malediction appointed them) from the Menstrua being long suppressed, the Blood not only swells up, and its Sulphureous parts being too much carried forth, are rendred more apt for burning, but besides, the mass of the Blood is imbued with very fermentative Particles, so that (as hath been already hinted) as if it were touched with a venemous infection, presently growing fervent, it is disposed towards putrefaction, and corruptive disorders; and besides, forthwith impoysons the nervous Liquor, and renders it infestuous to the Brain and the whole nervous stock. These kind of evils, being impressed on the Blood, ought to be purged forth, by the Flux of the Lochia; but if after the Birth, the Womb be

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out of order, the Lochia are not only ſtopped, and ſo a purifying of all the Blood is hindred, but beſides, ſtinking corruptions or defilements, are thence beſtowed on the Blood, and grievouſly infect it: Alſo, by reaſon of convulſive motions, begun about the Womb, and from thence continued to other parts, inordinations are ſtirred up in the Blood and juices, which oftentimes conſpire, either the production, or the acerbation or growing worſe, of the Feaver.

The evident cauſes, which induce an actual effervescency, either to the Blood, having gotten an ill diſpoſition, or invert the vices of the whole Body to the Womb, are after a diverſe ſort. A painful Labour, a ſolution of the unity about the Womb, a bruiſe, a retention of preternatural things, an ulcerous diſpoſition, and very many other accidents, which are induced by a certain neceſſity, may do this. But the occaſions, that are at the diſpoſe of the Patients, and eaſily to be avoided, which are wont to excite this kind of Feaver, are chiefly two, *viz.* an ill manner of Dyet, and the taking of cold. It is an uſual thing, to give to weak Women, after being Delivered, on the firſt or ſecond day, the fleſh of living Creatures, or Broths made of fleſh meats, and other foods, very improportionate to their diſpoſitions, from whence preſently ariſe an indigeſtion, and great trouble in the Bowels, and a feaveriſh diſtemper in the Blood, by reaſon of a more rich nutritious juice than ought to be. Beſides, the errors in Dyet, oftentimes hurt is cauſed, for that their Bodies, being ſo very tender, alſo by reaſon of the labours of the Birth, and bringing forth the Child, the paſſages are on every ſide opened, they are expoſed too heedleſsly to the cold: for moſt of them, being impatient of their Bed, within a day or two, or ſooner than they ſhould do, riſe out of it, and put on their Cloaths, from whence, preſently the Pores of the skin being ſuddenly contracted, and the Air being admitted into the parts of the Womb, tranſpiration is hindred, and often the Lochia, on the ſudden are ſtopped, either of which ſuffices to excite the feaveriſh diſtemper.

The conjunct cauſe, or formal reaſon of this kind of ſickneſs, chiefly comprehends theſe three things, to wit, there are preſent, firſt, a very notable diſcraſie of the Blood, that growing hot, from the Feaver being occaſionally induced, it doth not equally burn forth, nor leiſurely overcome the aduſt recrements, and afterwards critically thruſt them forth; but the Blood growing hot, is preſently looſned in its mixture, and its frame being unlocked, turns and declines towards corruption; hence, when it grows but a little cool, the ſpirits being ſhaken out of their dominion, are moved into confuſion. In the mean time, the Sulphureous Particles become untamed, and fierce, wherefore, the ſtrength falls down without any manifeſt cauſe, the Pulſe is made weak and diſordered; after the deflagration of the Blood, altho the aduſt recrements are very much heaped up, yet nothing is rightly concocted or ſeparated, but the ſick being greatly oppreſſed in Nature, tho they continually ſweat, receive nevertheleſs oftentimes no eaſe from thence; but the feaveriſh matter, which ought to be thruſt forth, being tranſmitted into the head, and nervous ſtock, induces there moſt grievous perturbations of the animal regiment. Secondly, the Tragedy of this Diſeaſe owes no ſmall part of it, to the nervous juice being preſently made ſharp, and ſo improportionate to the Brain, and its Appendix; for this being infected, from the taint contracted from the Blood, doth not gently water, or pleaſantly blow up its ſubjects, but notably hale or pull thoſe tender parts, (as when an infuſion of vitriol is poured upon a Worm) and irritates or provokes them into convulſions, and into motions, as if of dancing or ſuddenly leaping forth, and ſometimes wholly overturns their functions; hence comes contractures, grievous convulſions, dilerium, wakings, and ſometimes ſtupification, and the ſleepy Diſeaſe, upon Women Lying in. Thirdly, whilſt theſe things are done, oftentimes a third band of ſymptoms infeſt the ſick, to wit, for that the Womb, being hurt by ſome evil, moves it ſelf diſorderly, and is ſtruck with a Convulſion, according to theſe or thoſe parts, from thence by and by, convulſive motions invade, by the membranes, and nervous paſſages, the whole Region of the Abdomen; wherefore, the Viſcera and Hypocondria are blown up, belchings, and grievous vomitings are ſtirred up, then the Diſtemper creeping upwards, and poſſeſſing the nervous parts of the Thorax, a difficult breathing, and unequal, a palpitation of the heart, a ſenſe of choaking in the throat, by reaſon of the Muſcles being there drawn backward, and other ſymptoms, through the whole Body are excited, the ſame evil being at laſt carried to the Brain.

The Feavers of Women in Child-bed almoſt never want danger; but ſometimes it happens, about the beginning, that they are cured by a ſlender Dyet, and by the Flux of the Lochia being reſtored; but if the feaveriſh diſtemper does root it ſelf more deeply, that the whole Blood is inkindled, and immoderately grows hot, the Prognoſtick ought not to be eſteemed of a light Omen; and there will be a greater reaſon of danger, if beſides the heat being ſuffuſed all over, the ſick are troubled with a frequent ſhivering, if they are affected or moleſted with a great diſquietneſs, and wakings, with ſudden concuſſions of the Body, or a contracture of the Tendons: or if, thirdly, they complain on the fourth day, of a tingling of their ears, with a great repletion or fulneſs of the head, you may from thence collect the evil to grow worſe, *viz.* a tranſlation of the feaveriſh and hurtful matter to the Brain; nor is it leſs to be feared, if they have on them an oppreſſion, and weight of the *Præcordia*, that the ſick cannot breath freely, nor draw their breath deep, and from the bottom of their breaſt, but only from the top, and that frequently, and ſighingly, and that they move themſelves reſtleſly hither and thither: For this argues the Blood to ſtagnate in its circulation, about the Heart and Lungs, and alſo to be apt to grow into clodders, and to be coagulated: that if yet worſe diſtempers of the Brain and nervous ſtock follow, and the Pulſe ſhould become weak and unequal, you may pronounce the buſineſs almoſt deplorable; but if (as ſometimes tho it more rarely happens) after the Feaver being inkindled, and grievouſly threatning, either the Flux of the Lochia returns, or a Diarrhea with eaſe ſucceeds, ſome hope of health may be admitted, tho the ſame be at the laſt caſt.

Concerning the Cure of theſe kind of Feavers, there lies a very great task upon the Phyſitian, becauſe any Phyſick is eſteemed with the vulgar, not only unprofitable, but alſo hurtful for Women in Child-bed; wherefore, Phyſicians are rarely ſent for, unleſs when there is no place left for remedies, and the opportunity of all profitable means be wholly paſt: If that perchance they ſhould be preſent, about the beginning of the Diſeaſe, it will not be eaſie to procure health to the ſick by vulgar Remedies; but whatever they ſhould attempt, unleſs it ſhould bring help, it would be ſaid by the Women, and others about the perſon, to be deadly, and the only cauſe of her death; that in truth there is wont to happen to us, leſs of profit, or more of ignominy, about the Cure of no other Diſeaſe, as in this.

But the method of curing (even as in Contagious Diſeaſes) ought to be inſtituted twofold; to wit, Prophylactic or Preventive, and Therapeutic or Curative: The former of theſe, delivers precepts and cautions, whereby Women Lying in, may be preſerved from the aſſault of Feavers: the other ſuggeſts Curative intentions, whereby the ſick (if it may be done) may at length recover health.

1. Although this Feaver be ſomewhat Malignant, it is not caught by Contagion, and there is no fear of the ſicks receiving outwardly any invenomed taint; notwithſtanding, all Women in Child-bed, have an innate mine of virulency, and from the evil of this, as it were the tinder of moſt high Malignity, they ought to beware; wherefore, they need an exact ordering, to wit, whereby after the Birth, the impurities of the Blood and humors, may be rightly purged forth, without danger of a Feaver; alſo, that the evil affections of the Womb, may be healed, and that the ſtrength being broken and debilitated, by the Labour, may be reſtored after its due manner. For theſe ends, theſe three things are chiefly to be inculcated, for preſcripts by Phyſitians. Firſt, I judg it neceſſary, that a moſt exact manner of Dyet be commanded to Women in Child-bed; to wit, that they be wholly fed with Oatmeal Caudle, made ſometimes of Beer, and ſometimes of Water and White-wine mixt together, alſo with Panada, and other light nouriſhers, for a week at leaſt; becauſe they are much emptied, therefore it may be lawful for them to ſup often, but nothing of ſolid or more ſtrong food is to be given. For I have diligently obſerved that theſe Feavers have been oftenеſt induced, by the eating too ſoon fleſh, or ſtrong Broths or Food. Foraſmuch as Women Lying in, ought to be handled, not only as thoſe that are grievouſly wounded, but as thoſe that have got a feaveriſh indiſpoſition, from a diſturbed diſpoſition and temper of the Blood: For with them, the Blood being already too much carried forth, and as it were touched with an impure infection, moſt quickly catches Flame, by the acceſs or means of any Sulphureous thing. Secondly, after Dyet, the care will be, leſt the Pores be ſhut up, by the incautiouſly taking cold from without, or that the Lochia ſhould be ſtopped: for upon the leaſt occaſion, the manner of tranſpiration being changed, the Blood firſt growing hot, conceives diſ-

orders;

orders: alſo the Womb being touched by the blaſt of Air, contracts it ſelf, and ſhuts up the mouths of the Veſſels, whereby the Lochia flow forth leſs: wherefore, for five days at leaſt, after being Delivered, I would have Women wholly to keep their Beds. I know that 'tis a common cuſtom, to raiſe them from Bed on the third day, but by that means I have known many that have fallen into Feavers; and in truth, if we deſire to keep Women in Child-bed from all danger, the ſafeſt means will be, that they may be kept long in their Beds. Thirdly, concerning preſervation, the intent remains, that by cauſing a gentle provocation of the Blood, in Women Lying in, the Flux of the Lochia may be continued: for this end, Midwives are wont (if after a difficult Labour they fear that evil) to give them *Sperma Ceti*, or powder of *Iriſh*, Slate, or Saffron ſteeped in White-wine: Moreover, to make them Oat-meal Caudle, that may more fuſe the Blood, of Water, and White and Rheniſh Wine mixed together, in which they boyl, or in poſſet drink alſo, Marigold Flowers, leaves of Penyroyal, or Mugwort, there are many other kinds of adminiſtrations extant, about the ordering Women in Child-bed, which being commonly known, I willingly paſs over here.

The Cure of the ſubſequent Feaver of Women in Child-bed, is far from the uſual method in Putrid Feavers: for in this, it is not to be expected, that the Blood being touched with a feaveriſh burning, ſhould by degrees burn forth, and the ſame ſhould be ſeparated by a Criſis, but rather (as it is done in a Malignant Feaver) as ſoon as the Blood grows immoderately hot, it is convenient for it to be moved by gentle Diaphoretick Remedies, and its heterogeneous and impure mixtures to be carried forth of doors; wherefore, among the common people it is a cuſtom (and that not bad) to give to feaveriſh Women Lying in, ſudorificks preſently: by this means, the Blood being eventilated, its effervency is allayed; alſo, by reaſon of its agitation, the Lochia apt to be reſtrained, are provoked into a Flux. There is great difference among Authors, from whence the beginnings of theſe kind of Feavers ought to be computed, *viz.* whether from the Birth it ſelf, or from the firſt ſenſe of growing feaveriſh? however it matters little whether it be after this or that manner: For ſince this Feaver runs not the uſual ſtadia or courſes of the Putrid, neither hath a Criſis, nor wholly admits the uſe of Cathartic or Purging Remedies, we need not be ſolicitous ſo much for the days, concerning its period and menſuration. But yet, as to the Curative indications, it will be of uſe only to diſtinguiſh what is to be done in the beginning, increaſe, and end of this Diſeaſe: alſo, what we ought to indeavour whilſt there is ſome ſtrength remaining, as alſo what, when 'tis oppreſſed, and very much dejected.

When therefore any Woman in Child-bed is firſt taken with this Feaver (whoſe aſſault is known from the milky Feaver, becauſe for the moſt part it begins with a ſhivering) you muſt preſently let it be your work, that the more plentiful ſuſtenance may be drawn away from the burning Blood, and as I have already admoniſhed, that the fleſh of living Creatures, and Broths made of them, be utterly forbidden; yet in the mean time, all cold things, and that are indued with a ſtyptic or binding vertue, are equally to be avoided; for theſe fix the Blood, and bind it too much, and hinder its very requiſite Purgation, both by the Lochia, and by tranſpiration thorow the skin. But rather, though the Feaver be urgent, give them decoctions, powders, and confections of things moderately hot: of which ſort are, (as is already ſaid) decoctions, or Diſtilled Waters of the Flowers of Marigoids, the Leaves of Pennyroyal, Mugwort, the roots of Scorzonera, alſo Bezoartic Powders, Spirits of Harts-horn, fixed ſalts of Herbs, &c. If the Lochia ſhould be ſtopt, that their Flux may be again provoked, muſt be indeavoured every way: To the moving of this, conduce frictions and ligatures about the Thighs and Legs; ſometimes Cupping-Glaſſes, or Bliſters about the Thighs or Hips, alſo in the ſoles of the Feet: alſo, ſometimes the opening a Vein in the Ankle is convenient, in the mean time a fomentation of the hyſterical decoction, is to be applied about the Pubis, or the Caul of a Weather or Sheep, taken out warm, may be layed to the bottom of the Belly; and experience manifeſts, that ſometimes injections into the Womb are profitable: If the Belly yields not, it may be gently brought down, with a violet ſuppoſitory ſo called, or an emollient Clyſter; of more ſtrong provocations you muſt take heed, becauſe in Women Lying in, even as in a Malignant Feaver, from a copious dejection, with loſs of Spirits, Life is quickly loſt. If with the ſuppreſſion of the Lochia, there be a notable perturbation of the Blood, with vomiting, thirſt, and wakings, I have often known,

Laudanum mixt with Saffron, given with happy ſucceſs. Inſtead of a cooling Julep, this kind of mixture is convenient, *viz.* take of water of Pennyroyal, and Balm, each three ounces, of hyſterical water two ounces, of the Syrrop of Mugwort three ounces and an half, of the tincture of Saffron two drams, of Caſtor ry'd in a rag, and hung in the glaſs, one ſcruple, mingle theſe, and let them drink of this three or four ſpoonfuls oftentimes in a day.

2. If notwithſtanding the uſe of theſe Remedies the Feaver grows ſtill worſe, and by degrees is increaſed with worſer ſymptoms, that beſides the diſorders of the Blood, the Brain and nervous parts begin to be touched, Medicines, tho many of every kind may be tryed, do little; yea, in this caſe the indications are almoſt the ſame, with thoſe made uſe of in the Plague it ſelf: foraſmuch as the Lochia being for a good while ſuppreſſed, they cannot eaſily be reduced, or ſcarcely at all, in the great confuſion of the Blood and humors, therefore it is convenient quickly to move a ſweating, to wit, that the corruptions, impreſſed on the Blood and nervous juice, and reſtagnating from the Womb, may be carried forth ſome how, by ſweat, and inſenſible tranſpiration. Therefore here, Powders, and Confections of Bezoar, Spirit of Hartshorn, or of Soot, tinctures of Corals or Pearls help. I have ſometimes ſeen, by the help of theſe kind of Medicines, in a deſperate caſe, when the Pulſe, and other ſymptoms have appeared a little better, ſome ſmall hopes to ſhew themſelves; yet Cure rarely to follow: but when the uſe of theſe Cordials were left off, the ſick with a weak Pulſe, and a Looſneſs preſently ariſing, have been precipitated to Death.

3. When yet the buſineſs of the ſick proves ſtill worſe, when the Feaver being increaſed, the Pulſe is weak and unequal, and frequent horrors, and convulſive motions in the whole body, with a delirium, and ſtupefaction infeſt them; then the Phyſitian having firſt made a Prognoſtication of Death, may inſiſt upon a few Remedies, and thoſe only Cordials, and muſt wholly abſtain from blood-letting, ſcarification, bliſtering, or the uſe of Cupping-glaſſes: for ſuch adminiſtrations beget only an odium and blame, that by ſo doing, we are eſteemed by ſome Women, as wicked and cruel.

The Symptomatic Feavers of Women in Child-bed.

THE Acute Diſeaſes of Women in Child-bed, ſhew themſelves not only according to the Figure of the aforeſaid Feaver, but ſometimes they are beſet with ſome ſignal ſymptoms, to wit, the Squinancy, Pleuriſie, inflamation of the Lungs, Dyſentery, Small-Pox, or of ſome other kind; and at that time, they get the appellations of thoſe Diſtempers. It will not be here ſeaſonable, to repeat at large, what belongs to the eſſences and natures of each: but I ſhall briefly ſhew, what theſe ſickneſſes, being complicated with the diſtempers of Women Lying in, contain peculiarly, as to the Cauſes or Cures.

All theſe ſymptoms, we ſuppoſe to proceed, from a certain Coagulation of the Blood, and from thence its extravaſation: But whilſt the Blood is extravaſated, or put forth of the Veſſels in one part, its efflux, however natural, and critical, is hindred in another: wherefore it is dangerous, leſt whilſt the Blood begins to be coagulated, either in a particular or accuſtomed neſt of Coagulation, or univerſally in its whole maſs, the flowing of the Lochia be ſtopped, which in truth for the moſt part happens, and therefore theſe Diſtempers, for the moſt part, are deadly to Women in Child-bed: yet the cauſe of their Death, for the moſt part, happens with ſome difference, *viz.* in the Small Pox, the flowing of the Lochia, draws inwardly the malignity, begun to be carried forth outwardly, and forthwith compels the maſs of Blood, and the heart it ſelf, to be impoyſoned, with its evil; and therefore in the Small Pox, theſe purgings of the Womb, are convenient to be ſtopped: But in the Pleuriſie, Squinancy, and the reſt, when the provocative of the Diſeaſe, being fixed here or there, in a particular place, draws to it ſelf the impurities of the Blood, which ought to be ſeparated or ſifted forth by the Lochia, and derives it ſtreight from the Womb, for that reaſon it increaſes the impurity of the Blood. The Lochia being ſtopped in the Small Pox, by the more univerſal manner or way of excretion, may be ſhut forth of doors, with the venemous Particles of the Diſeaſe, which thing indeed does not ſucceed in the reſt, by reaſon of the minute, and more ſparing manner of excretion.

Of theſe, the Squinancy, Pleuriſie, and Inflamation of the Lungs, by reaſon, both of the great ſimilitude of the Cauſe, and analogy of the Cure, may be conſidered tógether: when any Woman Lying in is diſtempered with any of theſe, it is to be ſuppoſed, that beſides the Infection, gathered together in the time of being Big-bellied, there happens a certain ſouriſh diſpoſition of the Blood, by the means of which, whilſt that it ſelf grows feaveriſhly hot, certain Particles of it, being fuſed with the ſourneſs enter into congelation, in this or that part, like Milk growing ſour, and then to be coagulated: The Blood being there frozen or congealed, and hindred in its circuit, ſtops the paſſage of the reſt; but the Blood being obſtructed in its motion, buts againſt the impediment, and ſo being heaped up about it, and driven forth of the Veſſels, grows into a tumour: from thence preſently, whatſoever is contained in its maſs, that is heterogeneous, and to be ſifted forth, is layed aſide into the diſtempered part, as it were a ſink: wherefore, the corruptions of the Blood, that ought to be purged forth by the Womb, are derived from thence towards the neſt of this Diſeaſe, which, when they cannot be ſufficiently purged forth by this way, both more remarkably corrupt the Liquor of the Blood, and render the particular diſtemper, *viz.* the Squinancy, Pleuriſie, or any other more hard to be cured.

For the Cure of theſe kind of complicated diſtempers, preſently from the very beginning, it ſhould be endeavoured, that the Blood being fixed ſomewhere, and begun to be extravaſated, may be reſtored to Circulation, that it may not impoſtumate; becauſe, very rarely, Women Lying in, are cured of theſe Symptomatic Feavers, by an Impoſthume, or ſpitting forth of the corrupt matter: Wherefore, internal Remedies, which fuſe the Blood, and free it from Coagulation, are to be made uſe of; of which ſort are chiefly Diaphoretics full of a volatile Salt, as Spirit of Hartshorn, Soot, Urine, alſo the Salts themſelves; in like manner Shelly and Bezoartic Powders, Lapis Prunellæ, Decoctions and Juleps of Vegetables provoking Urine, or the terms, with all which ought to be mixed, what by experience are found proper for the diſtempers of the Womb: Beſides, diſcuſſing Remedies, which may drive away the impacted matter, and diſperſe it (of which ſort are Liniments, Fomentations, and Cataplaſms) are diligently to be applied. In the mean time, the more impetuous motion, and immoderate effervency of the Blood, are to be removed, and its purgings, by all the ways poſſible transferred to the inferior parts. For this end Frictions, Ligatures, Epiſpaſtics, and (if need be) Scarifying about the Feet and Legs, are to be adminiſtred; if the diſtemper very much growing worſe, a taking away of Blood be indicated, unleſs there be a great fulneſs in the whole Body, and a very acute inflamation in the diſtempered part; it will be beſt to open a Vein in the Foot, or to take away Blood from the hemorrhoid Veins by Leeches: But if neceſſity urges, it may be done in the Arm it ſelf; if after that Letting Blood (if another be admitted) let it be done in the Leg; but you are to be warned, that in theſe caſes, the opening a Vein is to be ordered very cautiouſly, for unleſs it brings preſent help, (which I have rarely known it to do) immediately the Pulſe being made more weak, the buſineſs of the ſick becomes much worſe.

The Dyſentery takes its riſe almoſt for the like cauſe, with the aforeſaid diſtempers; but in this, becauſe the extravaſated Blood is preſently poured forth, nor being retained in the Body, becomes there troubleſome, or is any more corrupted, and as this Flux makes an excretion near the Womb, and does not afterwards dreive it to any other place, there is leſs of danger to be feared, from this Diſeaſe, than from thoſe aforeſaid: yet oftentimes this Diſeaſe is fatal to Women in Child-bed, for that indeed, the rather, becauſe things attempering the Blood, and moderately binding, are ordered for the Dyſentery: for theſe are found too apt to inhibit the Flux of the Lochia; wherefore in this caſe, until the Women Lying in are ſufficiently purged by a long Flux, the Cure of the other Diſeaſe is to be omitted, and the fierceneſs of the ſymptoms is to be allayed, only with gentle aſſwaging things.

The indications of the Small Pox, do not only differ from thoſe above deſcribed, but indeed they are beſet with contraries to themſelves; for they require (as hath been ſaid) that the Flux of the Lochia ſhould be moderately ſtaid: yet, in the mean time, that the flowring forth of the Blood, and a gentle ſweat ought to be continued; for when in this Diſeaſe, the invenomed ferment is twofold, and the corrupt Particles of the Blood, are carried outwardly in a twofold way, you muſt beware, leſt that the leſſer, and ſtraiter part, ſhould draw to its door, the whole matter, or more than it were able to ſend forth: therefore, leſt the Lochia flowing more plentifully,

tifully, ſhould recall inwardly the venom, apt to flower outwardly, the manner or way of Dyet is ſomewhat to be changed, and ſpecially thoſe things which have a poyſon reſiſting force, and are alſo aſtringent (as the roots of Tormentil and Biſtort) are to be boyled in the Broths of the ſick; alſo Powders, Juleps, and Opiats, indued with ſuch like virtue, are convenient to be adminiſtred at due intervals: yea, in this caſe, by no means, Women ſhould be indulged, that they might eat fleſh, or Broth made of it, or to riſe out of their Bed: but the quiet, both of mind and Body, is to be procured, as much as may be, and a Dyet to be ordered of thoſe things, that move not the Blood, and the buſineſs almoſt wholly to be committed to God and Nature.

What hath already been ſaid, concerning the acute Diſeaſes of Women in Childbed, may eaſily be illuſtrated with Hiſtories and Obſervations: But examples which may be brought in this thing, for the greateſt part, are mournful and of an ill chance: becauſe thoſe Feavers for the moſt part end in Death. But to deſcribe theſe kind of ſickneſſes, does neither confirm the work of the Phyſitian, nor render approved the method of Medicine, altogether taken in them; however, becauſe the knowledg of theſe may make for the better diſcovery of this Diſeaſe, I ſhall here propoſe ſome ſingular caſes of Women Lying in, and variety of ſymptoms; in which, altho the forms and means of Cure more ſparingly occur, yet we may have ſome rules of precaution, of no contemplable uſe.

A Gentlewoman in her ſix and twentieth year of her Age, brought forth her ſixth Child, with very difficult Labour, and not without danger of her Life; yet preſently after, ſhe began to be better; on the ſecond day ſhe eat a whole Chicken, on the third roſe out of her Bed, and ſate in a Chair for four hours; the night following ſhe found her ſelf ill, at which time her Milk came into her Breaſts; which, by the application of Diaculum Plaiſters, ſoon vaniſhed; the next morning ſhe complained of a wearineſs, and as it were an ulcerous pain of her whole Body, alſo of a vomiting, nauſeouſneſs, and fulneſs about the Ventricle, and Hypochondria: the following night was full of trouble; on the fifth day ſhe was plainly in a Feaver, ſhe felt now a ſhivering, now a heat, every where increaſing, ſhe nauſeated every thing, and was troubled at her Stomach, moreover being unquiet, and without ſleep, the Lochia flowed little, but a whitiſh humor (commonly called the Flux of the Milk) came away: In the evening ſhe had a weight, and as it were a ſleepineſs about her forehead and temples, and began to ſleep a little; but awaking in half an hour, being diſturbed with Phantaſms, ſhe complained of her head, as if increaſed in bulk, alſo of her jaws being ſet, that ſhe could not open her teeth, and her fiſts being ſtrongly clutched, ſhe ſeemed as if ſhe felt a pricking and ſtupor, or numneſs in her whole Body; her Ventricle and Hypochondria ſtood ſtill inflated, and ſtretched forth; they adminiſtred to her Frictions, Ligatures, Cupping-glaſſes, and other Remedies, both inward and outward, that might recall the Lochia, and drive the recrements of the Blood from the head: Her Pulſe being weak, and diſordered, would not admit of Letting Blood; Powders, and Juleps, which might gently move ſweating, and fuſe the Blood and nervous juice, and hinder them from reſtagnating, were diligently given her; yea, fomentations, now of Wollen Cloaths dipped in emollient Decoctions, and now of warm inwards of living Creatures, were applied to her Belly; in the mean time, ſtinking things (ſuch as they uſe to the Mother Fits) were put to her noſe, which might drive away the impetuouſneſs of the Spirits and Blood, carried into the head, but theſe, and other things, being for ſeveral hours carefully performed, ſhe ſeem'd to feel ſome eaſe; but ſtill ſhe feared to ſhut her eyes, or to ſettle herſelf to ſleep, for her eye lids being cloſed, a thouſand Phantaſms ran in her mind, with noiſe and tingling in her whole head: ſhe continued that night almoſt without ſleep; aſſoon as ſhe had begun to ſleep, preſently being affrighted, and feeling a weight in her Precordia, ſhe was awaked: on the ſixth day about noon, ſhe was troubled with a great ſhivering, or rather an horror, with a ſtrong concuſſion of the whole Body; to which, as in the fit of an Ague, by and by heat, and then ſweat copiouſly followed: but from thence, nothing of eaſe accrued to the ſick, for preſently after the ſweat, the feaveriſh heat was renewed, and convulſive diſtempers infeſted her more: the night following, with the reſt of the ſymptoms growing worſe, firſt a Palſie was excited in her tongue, and by and by in her throat, that ſhe could not ſpeak, and ſcarce ſwallow at all: on the ſeventh day, about the ſame hour, a ſhivering invaded her again, with heat and ſweat; then her Pulſe being much weaker,

and

and unequal; alſo a difficult breathing, and fetching the breath ſhort and quick, with her Breaſt lifted up, ſhe knew not them about her: on the eighth day ſhe died.

There was a manifold occaſion of the death of this Gentlewoman, prediſpoſed to a Feaver, by reaſon of her Big-belly, and which had increaſed the malignity of the Diſeaſe over and above; for the hurt received by her hard Labour, the ſudden excluſion of the Milk from her Breaſts, the eating of fleſh, and the riſing too ſoon out of her bed, hapning together, made as it were a conſpiration for the greater evil: The Blood being touched with a feaveriſh burning, preſently conceived inordinations, and ſnatched into it ſelf the Lochia, and perhaps other defilements of the Womb, and ſo by that means acquired a greater infection, and plainly venemous diſpoſition; the membranes of the Viſcera, being imbrued with the degenerate nervous juice, were ſtruck either with Convulſive motions, or with Convulſions continued to them from the Womb; for theſe kind of inflations, about the Abdomen, and thoſe diſtentions are the effects of Convulſions: For altho the direct Fibres drawing the member do oftentimes preſs it, yet ſince the Fibres are direct and tranſverſe, and others placed in a various ſite, the membranes are pulled together into an hollowneſs, by their coming together, the part ſwells up like a blown bladder, into whoſe vacuity the Air being rarefied ſecondarily carries it ſelf forward: But it is not the Air (as is commonly ſaid) or a blaſt there at firſt heaped up, that is the cauſe of the diſtention. The Blood growing hot in our ſick perſon, and being quickly filled with an aduſt and malignant matter, did endeavour to ſubdue it, and being unable to put it forth by ſweat, forthwith fixed it in the Brain; the firſt ſuffuſion of the ſame matter into the head, by reaſon of the animal Spirits being half overthrown, brought in that ſenſe of her head being much increaſed in bulk; which thing happened by the like means, as when the foot being taken with a ſleepineſs, ſeems as if it felt much bigger than it is: But that after ſome eaſe, the diſtemper grew worſe, by ſleep and cloſing of her eyes, the reaſon is, becauſe waking, and the exerciſe of the ſenſes, ſhake off and remove from them, ſomewhat, the matter beſieging the Brain and Nerves; which notwithſtanding being neer and in its precincts, ſleep creeping on, is as it were ſupped up by them, and enters their Bodies more deeply with the alible juice. But the Blood, altho it had plentifully poured forth its recrements in the Brain, yet did not itſelf become free; but being ſtill full, with an impure ballaſt, it conceived as it were a critical flowring, and attempted to ſhake off its burthen once or twice (as it is wont in a great excretion) with a ſhivering, and with heat and ſweat following it, by which endeavour however nothing was further effected, than that the matter ſticking to the Brain, pierced more deeply into it, and becoming fixed in ſome little ſhoots of the Nerves, took away her ſpeech and ſwallowing, and afterwards her ſenſes; and the maſs of Blood, being by degrees more and more depraved, at length became unable to ſuſtain Life.

A noble Gentlewoman, being married a little before ſhe was twenty years of Age, and being with Child, uſed, during the time, an ill dyet, and little or no exerciſe; yet falling into Labour, and ſuffering the torments with intermiſſion, and frequent eaſe for twelve hours, at length was brought to Bed of a Son: The Child, with the after-birth came away, and all things were right about the Womb: the firſt and ſecond day ſhe found her ſelf indifferently well, but on the third, after a light ſhivering, ſhe began to complain of thirſt and heat; to which a looſneſs followed, that ſhe had that day four ſtools: the following night ſhe was almoſt without ſleep, the feaveriſh diſtemper remained, after that, in the ſame manner for two days; daily ſhe purged three or four time; the Lochia as yet flowed moderately: when on the ſixth day, by the perſuaſion of the Women, ſhe had took ſome aſtringent thing, to moderate the Flux of her Belly, the purgings of the Womb were almoſt wholly ſtayed: at which time the Feaver became more ſtrong, and ſymptoms as it were hyſterical appeared; for in her Precordia, ſhe had great and frequent oppreſſions, and was troubled with a ſenſe of choaking in her throat; on the ſeventh day, the heat was yet ſtronger, and her breathing difficult and laborious; but then, by the preſcription of a Phyſician, at that time firſt ſent for, Blood was taken from her foot to three ounces, by which ſhe was better for four hours; for a quiet ſleep, with a plentiful ſweat followed upon it, and the Lochia appeared again tho in ſmall quantity: In the Evening again, all things grew worſe, her ſtrength being very much loſt, her Pulſe weaker and unequal; ſhe complained alſo of a noiſe and tingling of her ears, with a fulneſs of her head, moreover a leaping up of the tendons in her wriſts; alſo ſhe had ſudden con-

concuſſions of her wholy Body, yet ſtill her looſneſs held; to her were adminiſtred, by the preſcripts of ſeveral Phyſicians, Cordials, and other Remedies, and kinds of Adminiſtrations carefully, but nothing profited: her Pulſe being more weak, and her ſtrength leiſurely waſting, ſhe died on the ninth day, after ſhe was delivered.

This Feaver very much depended upon the vitious proviſion of the Body, as the procatartic cauſe; for I have often obſerved, that it fares ill with Women Lying in, who when Big bellied devoured fruit, and any unwholſom traſh, and living without motion or exerciſe, indulged themſelves with eaſe and reſt: the Blood, by reaſon of the previous Cachexie, conceived a burning without any evident cauſe, as it were of its own accord: But growing hot, laying inwardly ſtill its recrements, and impurities, cauſed the Diarrhea: neither yet was its maſs made more pure, by its almoſt continual excretion, yea, rather being ſtill more depraved in its mixtion or craſis, the Blood at length wholly departed from its proper diſpoſition, and became unable to be fermented in the heart, whereby heat and breath might be every where diſperſed: The looſneſs, excited by the motion of Nature, was untowardly ſtopped, eſpecially by the uſe of aſtringent things; for this I have often obſerved, never to be done without paying for it; becauſe the Flux of the Belly has cured ſome that have been ill, but in this Lady, and in many others (as has abundantly appeared to our experience) altho it did not take away the Feaver, yet it freed her from the more grievous diſtempers of the Brain and nervous ſtock: from whence this ſick perſon was wholly free from a Delirium, nor was ſtruck with Convulſive motions, till reduced almoſt to extremity.

The Mother of a Family, and a Gentlewoman, about 36 years of Age or upwards, being with Child of her ſeventeenth Child, was troubled, and very anxious, leſt ſhe ſhould die of that Child-bearing: But (God favouring) ſhe was delivered well enough of a Son, and for three days after ſhe was very cheerful: on the fourth day, when ſhe had eaten more than ſhe ſhould do of a Chicken, a little before night ſhe fell into a feaveriſh Diſtemper, with vomiting, and a ſtopping of the Lochia: all night ſhe lay reſtleſs and without ſleep, the next morning ſhe had four ſtools, and ſeemed ſomewhat eaſed: about Noon (about which time I came to her) ſhe complained again of heat and thirſt, as alſo a palpitation of the heart, and of the aſcent of ſome ſubſtance in her throat: her Pulſe was quick and ſmall, her Urine red, the Lochia ſcarce appeared: I ordered her Juleps, Cordials, and things to purge the Womb, beſides a fomentation for the bottom of her Belly, alſo her Legs and Feet to be rubbed often, with warm Wollen Cloaths; at going to ſleep I gave her of Laudanum one grain, with Saffron Pouder half a ſcruple, in a ſpoonful of Treacle-water: She ſlept well, and the Lochia came down plentifully, and by that means, with a ſlender dyet, and continuing to provoke moderately the Flux of the Womb, for a few days, ſhe became very well.

The immoderate eating of fleſh, as an evident and almoſt only ſufficient cauſe, without any great proviſion, or vitious prediſpoſition, induced the Feaver. The Lochia reſtagnating into the Blood, increaſed its intemperance, and preſently brought troubles upon the nervous kind; but in the mean time, the Blood altho growing hot, did not undergo any great corruption, but when the recrements, heaped up by the Surfeit, were ſent forth by the looſneſs, and the Blood, the Lochia being reſtored, began to be purged forth again after its wonted manner, this Feaver wanting a further malignant ferment, quickly vaniſhed.

A noble Lady, young, and fair, was brought to Bed of a ſecond Child, and for ſix days, as to the Lochia and other accidents, ſhe was well, and wholly free from the ſuſpicion of any intemperature: ſhe ate fleſh daily, and riſing from her Bed, was brisk and chearful in her Chamber; on the ſeventh day, without any manifeſt cauſe, a ſhivering came upon her, with a Feaver, and a leſſning of the Lochia, but not ſuppreſſed: to the tenth day after her Delivery, ſhe was only moderately feaveriſh; whilſt the purgings of the Womb yet flowed, ſhe remained free from any grievous ſymptom: but then, although ſhe was greatly feaveriſh, ſhe was more cheerful than ordinary, and ſeemed more confident of her health: at Night ſhe ſlept little or nothing; the morning following (at which time I firſt viſited her) ſhe clearly raved, the Lochia were ſtopped, alſo her whole Body was ſhaken with horror the tendons in her wriſts were pulled together, ſo that I could hardly diſtinguiſh her Pulſe, which in the mean time was weak, unequal, and very quick. I ſaid ſhe would die quickly, unleſs God ſhould miraculouſly reſtore her by his Divine Power, however, ſix grains of

of Oriental Bezoar being given her, in a ſpoonful of Cordial Julep, brought upon her a plentiful ſweat, with a better Pulſe; then other Cordials being given, with due intervals, gave ſome little hopes, tho I doubted they would not continue: after four hours from the time that I came, the ſick Lady had of her own accord a great Stool, and preſently her ſtrength wholly failed her, and within half an hour ſhe died.

When there hapned nothing of ill to this Lady, as to her Delivery, or Womb, ſo pernicious a Feaver, and ſo ſuddenly Mortal, could not happen without a great and malignant procatarſis of the Blood and humors: whether a more full Dyet, or taking Cold, or any other evident cauſe, gave a beginning to this is uncertain; becauſe, the Women and Nurſes helping her, knew of no manifeſt occaſion of her ſickneſs: The Feaver being inkindled, the infection of the Blood could not be wholly carried away, by the purging of the Womb, tho long continued; tho for that reaſon, the more cruel ſymptoms came not preſently upon her, yet the evil ſtill lurked within, and the Diſeaſe being very acute, ſhewing it ſelf with a ſwift motion, on the fourth day, when Nature ſhould have indeavoured a Criſis, the matter of the Feaver being moved, but not overcome, as it were in a moment overturned at once, the Brain and nervous parts, whence Death was to be expected, and ſuddenly followed.

A Woman well known, who had ſcarce paſſed the twentieth Year of her Age, of a florid countenance, and ſlender Body, after her being brought to Bed when the Lochia flowed immoderately, made uſe of ſome aſtringent Remedies, by the counſel of thoſe about her, by which means they were wholly ſtopped; but a Flux of her Belly ſucceeded, which when it had increaſed for three days, the Women gave her other things for the ſtopping her Looſneſs: nor were they fruſtrated in the ſucceſs; in the mean time, in the place of the former evil, they had brought a moſt dangerous Feaver, and diſtempers as it were hyſterical: for the unhappy Gentlewoman Lying in, was troubled with thirſt, heat, wakings, and at ſeveral turns, with ſwoonings, and cold ſweats; at this time being ſent for, I preſcribed her Cardaic Remedies, and ſuch as moved the purgings of the Womb, and alſo a Clyſter to be given her: at length, the Flux of her Belly being provoked, the Lochia alſo came down, and the ſick Woman being freed from the aforeſaid ſymptoms, and the more grievous Diſeaſe, to wit, the Remedies of the Nurſes, quickly grew well of her Feaver.

The more plentiful Flux of the Womb, hapning to this Woman, removed the Procatartic cauſe of a more grievous Diſeaſe: wherefore, when they had committed ſo many errors about the ordering her, (*viz.* firſt in ſtopping the Lochia, then what might compenſate their defect, in hindring the Flux of her Belly) yet the Feaver was only light, and without any venomous taint impreſſed on the Blood; the like to this I have known to happen frequently, to wit, when at firſt the purgings of the Womb have flown very plentifully, afterwards when they have flown very ſparingly, and ſometimes ſtopped, the Women in Child-bed have eſcaped. And by the way, it is here to be noted, that it is wholly dangerous, to inhibit, or at leaſt divert, and croſs any motion of Nature, incited, tho irregular.

A Noble Gentlewoman, about 20 years of Age, indued with a ſmooth and full habit of Body, miſcarried twice in the ſpace of a Year; when ſhe had again Conceived, by the preſcription of her Phyſician, ſhe provoked a Vomit once a month, by drinking plentifully Poſſet Drink, by which ſhe was wont to caſt forth much thick tough Phlegm; alſo in the time of her being with Child, he Let her Blood 5 times; the time of her going being over, ſhe was brought to Bed of a Son, with very hard Labour; the Secundine came whole away, and ſhe purged notably: on the ſecond day, whilſt ſhe was lifted upon her feet in Bed, that the Sheets and the Blankets might be laid in better order, ſhe took Cold, and by that means the bloody Lochia wholly ſtopped, and only a little ſerous Water came away: on the third day ſhe began to complain of an acute pain in her right ſide, to which the Women laid Bags of Camomil made hot with Bricks, but the diſtemper grew worſe with a bloody ſpittle; on the fourth day of her being brought to Bed, a moſt ſharp pain, with a difficult breathing, and very Laborious, invaded her: by the preſcription of her Phyſician, then coming to her from the neigbourhood, ſix ounces of Blood was taken away, out of the Baſilic Vein, and ſhe felt ſudden eaſe, for 10 hours ſhe was better, in the middle of the night the pricking pain returned with its wonted fierceneſs: at length, other Phyſicians being called to Counſel, they agreed that it was neceſſary to open a Vein again, in the arm of the diſtempered ſide: four ounces of Blood being taken away, the pain remitted, and the ſick breathed better; then by Diaſphoretic Remedies, ſhe fell

fell into a great ſweat, with a quiet ſleep: But the Pulſe was made quicker and weaker, alſo contractures of the tendons in her wriſts appeared: preſently afterwards ſhe talked idly, and within 24 hours, after ſhe was laſt Let Blood, ſhe departed.

That this Lady fell into a Pleuriſie, with a Feaver, upon the Lochia being ſuppreſſed, the cauſe in ſome meaſure ſeemed to be, the Letting of Blood ſo often in the time of her being with Child: for by this means, the Blood being accuſtomed to be eventilated at the arm, afterwards growing hot, leaving the Womb, was carried violently towards the place of its letting forth, where, when it found not a paſſage, it fixed in the neighbouring ſide, as the next neſt to the place of extravaſation; yea, beſides the uſual manner of a Pleuriſie, there was no ſmall malignity hapned to this Diſeaſe; for the Blood being hindred from being let forth of the Veſſels, began preſently to be corrupted in its diſpoſition, and in the third day of the Feaver, was ſo much depraved, that it could not be any longer fermented in the heart ſo as to Prorogue Life.

It was not ſo with the Wife of a certain Smith, who was brought to Bed, at what time her Children had the Small Pox in the ſame Houſe, and ſhe her ſelf, as it ſeemed, had taken the Contagion of the ſame Diſeaſe, for on the ſecond day after her Delivery, they began to break forth with a feaveriſh heat, and pain in her Loyns, which indeed for three days, whilſt the Lochia moderately flowed, aroſe rightly into little ſwellings; altho the purging of the Womb was very copious at that time, ſhe had the Small Pox very thick all over her Body, not only in the ſuperficies of her skin, but alſo they filled the cavity of her mouth and throat, ſo that ſhe could ſcarce ſpeak or ſwallow: The ſixth day of her Lying in, the Lochia flowed immoderately, from whence preſently fell upon the ſick, a frequent ſwooning, with a flagging of the Small Pox, Convulſions, and other ſymptoms of an ill nature, which threatned Death ſoon; being ſent for, I preſcribed half a dram of this Powder, to be taken conſtantly every three hours, in a ſpoonful of the following Julep, *viz.* take of the Roots of Tormentil in Powder, drams two, of the beſt Bole Armonie, dram one, of the ſpecies of Hyacinth half a dram, make a Powder. Take of the Compound Water of Scordium, of Dragons, of Meadowſweet, each three ounces, of Therecal Vinegar one ounce, of the Syrup of Corals two ounces, of Harts-horn burnt half a dram, make a Julep. Beſides, I ordered to be boyled in her Broths, and in every thing ſhe drank, the Roots of Tormentil: by theſe Remedies, the purging of her Womb was ſoon wholly ſtopped, and the Small Pox by degrees being ripened, came off without any grievous ſymptom.

Indeed this caſe was difficult, and was cured with great danger, *viz.* for either the Lochia, or the Small Pox to have been reſtrained inwardly, was very dangerous, and yet the more full eruption of the one, hindred the motion of the other; ſo long as either moderately proceeded, things being permitted to the conduct of Nature was moderately well: but when one of them became ill, the work of Art was required, and it was requiſite to bridle the Lochia, but to provoke the Small Pox.

CHAP. XVII.

Of Epidemical Feavers.

HAving meditated rather a Commentary, than an intire Tract, I had thought here to have concluded our Diſcourſe of Feavers: But foraſmuch as certain Epidemical Feavers do often ſpread, which obſerve no Laws, nor can be brought to any certain rule of Doctrine, but being irregular vary every year, and for that reaſon, as often as any of them increaſe or ſpread abroad, preſently it is called the new Diſeaſe; therefore, I thought it worth our while, becauſe general precepts concerning theſe Feavers are not to be delivered, to ſubjoyn ſome particular Hiſtories, of ſome of this kind; for out of the various proviſion of ſymptoms, whereby they are wont to be noted, the nature and the whole formal reaſon of theſe kind of diſtempers, may ſomewhat appear. Since therefore of late years, within a ſhort tract of time, three popular Diſeaſes have ſpread in theſe Countrys, I will add, as a Crown to this work, the ſeveral Deſcriptions of them, made at thoſe times, when theſe Feavers raged.

A Deſcription of an Epidemical Feaver, ſpreading about Autumn, in the Year 1657. *taken in the middle of* September.

WHilſt we meditate the Deſcription of a Feaver, at this time cruelly raging, it is fit, that following the example of *Hippocrates*, we firſt conſider the foregoing conſtitution of the Year, its intemperance and exceſs of qualities. For Epidemical Diſeaſes, and commonly excited among the people, are from a common cauſe; ſuch as the habit of the Year, and by that means contracted, a diſpoſition of the Blood, by which many are alike affected. But that we may draw the matter from the beginning, the laſt Spring, and the time ſucceeding it, even to the end of the Summer, was all that half years ſpace extremely dry and hot, but eſpecially after the Summer ſolſtice, the heats were ſo intenſe for many weeks following, that day and night there was none that did not complain of the heat of the Air, and were almoſt in a continual ſweat, and were not able to breath freely: About the Calends of *July*, this Feaver, at firſt ſporadical or particular, began to break forth in ſome places, that perhaps one or two were taken in the ſame City or Village: In many it imitated the likeneſs of an intermitting Tertian, *viz.* the Fits returned every other day; which yet infeſted the ſick with a moſt intenſe heat, without any cold or ſhivering going before; Vomiting and Choleric Stools plentifully hapned to moſt, ſweat ſucceeding but difficultly, and often interrupted, whereby the feaveriſh fit rarely ended in a remiſſion, but that all the time between, the ſick continued languiſhing and weak, with thirſt and reſtleſsneſs; in ſome, when the buſineſs began to grow better, after three or four fits, cold and ſhivering began the fits, and the Feaver became an exact intermitting Tertian: But in moſt, the Feaver ſtill grew worſe, and preſently became of an evil nature, and difficult Cure, with a depraved proviſion of ſymptoms; for when the ſick were highly heated in their fits, and hardly ſweated, they were wont to commit errors, which daily increaſed the ſtrength of the Diſeaſe, becauſe by reaſon of the inpatience of the ſick, and the unskilfulneſs of Servants, the ſweat being interrupted, which ſhould have ended the fit of the Feaver, after one fit was ſcarce finiſhed, another preſently ſucceeded, and ſo the Diſeaſe was wont to have wandring and uncertain periods, without any intermiſſion between, and afterwards to paſs into a kind of continual Feaver. The condition of which, ſometimes being very dangerous, with an evil affection of the Brain and nervous ſtock, ſo that oftentimes a Lethargy, or Delirium, or not ſeldom cramps, and Convulſive motions, were excited: About the month of *Auguſt*, this Feaver began to ſpread far and near, among the people, that in every Region and Village many were ſick of it; but it was much more frequent in the Country, and ſmaller Villages, than in Cities or Towns. It was ſtill like an intermitting Feaver, unleſs that it ſeemed more infeſtous than that is wont, and with more cruel fits, and ſhorter intermiſſions, and therefore was called

the new Diſeaſe: beſides, it underwent the note of a certain malignity, and gave knowledg of its Contagion and Deadlineſs; inſomuch, that it crept from houſe to houſe, infected with the ſame evil, moſt of the ſame Family, and eſpecially thoſe familiarly converſing with the ſick; yea, old Men, and Men of ripe Age, it ordinarily took away.

If you reſpect the nature and eſſence of the Diſeaſe, this Feaver properly ſhould be referred to the rank of intermitting Feavers, for the fits returned at ſet times, alſo for the moſt part they began with cold and ſhivering, and oftenеſt with vomiting, and by and by a moſt intenſe heat proceeding, they were finiſhed at laſt with a ſweat. The Urine in moſt appeared of a flame colour, thin in the fits, with ſome hypoſtaſis, without it more thick, and with a rediſh ſediment; altho with a moſt copious ſweat, and often iterated, the Diſeaſe was not cured, which might be expected in a continual Feaver; yea, the diſtemper continued exceeding long, for many days, ſometimes months, tho much evacuation almoſt daily hapned by vomit and ſweat: which we obſerve frequently in an intermitting Feaver, rarely to happen in a continual; out of the fit, at any time of the Diſeaſe a purge was profitably inſtituted, which in a Synochus before the ſign of concoction, were a wicked thing to attempt; beſides, that this Feaver was of the intermitting kind, it ſeems to appear from hence, becauſe very many recovered of it, that ſcarce one of a thouſand died, which I ſcarce ever knew in an Epidemical Synochus. About the firſt beginnings of this Diſeaſe, it appeared very like to an intermitting Tertian, altho afterwards in ſome, by reaſon of the vitious proviſion of their body, and errors committed in Dyet, and ſweating, it ſeemed to change into a continual; for in whom the fits were not rightly concluded, nor ended in a remiſſion, by reaſon of the morbific matter not being throughly diſperſed, their Blood was continually hot: from whence it came to paſs, that the fits ſooner returned, and continued longer; till at length, by reaſon of the plenty of matter, and the languiſhment of Nature, the Blood being made weaker, endeavoured no longer to ſwell up, and to ſeparate the feaveriſh matter at ſet hours, but to ſubdue it by little and little, with a continual effervency.

We are to inquire concerning the cauſes of this Diſeaſe, what may be the leading, evident, and conjunct cauſe, *viz.* by the means of which it ſpread ſo generally, and became Epidemical through all *England*; by what means, and for what occaſion, it was wont to be excited in all men: and laſtly, what kind of alteration of the Blood and humors, being induced, brought forth this kind of Feaver, with ſuch a proviſion of ſymptoms, and conſerved it in the Act.

I know it is eaſie to place wholly the cauſe of this ſo popular Diſeaſe in the malignant conſtitution of the Air, to wit, that the Particles of the Air, in which we breath, were infected by a certain extraneous Infection, and not agreeable to our Nature; the little bodies of which Infections being admitted within, did ferment with the Blood and humors, and ſo in moſt, brought in this Feaver, almoſt with the ſame appearance of ſymptoms. For who dares deduce the original of a Diſeaſe ſo generally raging, from a leſs public fountain? or refer to any other place, the received cauſes of Diſeaſes, than to that neſt of Vital Air, on which every one feeds? But whilſt I more attentively conſider the thing, it ſeems to me, that its ſtem, and as it were its firſt beginnings, are to be ſought a little deeper. To wit, that this Feaver is born not from the Contagion communicated by the Air, and immediately fixing its evil on men, but rather from a certain feaveriſh prediſpoſition or nature, impreſſed ſomewhile before on our Bodies, becauſe of the intemperance of the Year, which at length having gotten maturity, on the leaſt occaſion is brought into Act, and ſo breaks not forth into this Feaver, ſo much as it ſifts it forth.

For when about the Calends of *July*, the Air was immoderately hot, with a moſt intenſe heat for many days, it eaſily altered our Blood towards an hot and bilous intemperance, by which (as in wine growing more hot than it ſhould do) the ſweet part, and the ſpirituous was much conſumed, in the mean time, the Saline and Sulphureous was too much carried forth, that by that means, the Liquor eaſily contracted a rancor or ſourneſs: We have in another place ſhewn, that this kind of diſpoſition of the Blood, whereby indeed it turns from a ſweet and ſpirituous temper, into a bilous or choleric, is moſt apt for intermitting Feavers: Hence the alible juice, which is continually carried into the maſs of Blood, is not rightly concocted, nor aſſimilated into Blood, but perverted as it were into an extraneous and fermentative matter: which ariſing to a fulneſs in the boſom of the Blood it ſelf, and growing turgid

turgid according to its increaſe at ſet periods, as we have already ſhewn, induces the fits of the intermitting Feaver: when therefore, from the great burning heat of this Summer, the Blood almoſt of all men, becoming more hot than uſual, was very much ſcorched, it is no wonder, if from thence it ſhould contract a great aptitude for intermitting Feavers. But why not whilſt the fervor of the Heaven was yet urgent, but a little after, this Diſeaſe ſpread it ſelf, the reaſon is, becauſe this indiſpoſition is not impreſſed on our Blood at once, or at one time, but by little and little, and not but of a long time; and therefore, Diſeaſes like Fruits, are chiefly ripened in Autumn, after the foregoing heat of the Summer.

This aptitude or feaveriſh diſpoſition, all do not contract alike; thoſe whoſe Blood is of a more hot Nature, and abounds more in Sulphur, and for that cauſe is ſooner ſcorched, alſo ſuch who labour, or ſtay long in the heat of the Sun, and open Air, by reaſon of their Blood being more remarkably torrified, more eaſily fell into this Diſeaſe; wherefore, at firſt, it chiefly raged among Husbandmen in the Country: of theſe, who had acquired an aptitude to this Feaver, from the Blood being before ſcorched, ſome perhaps fell into this of their own accord, the feaveriſh diſpoſition being leiſurely carried forth to a maturity; others, by reaſon of a light occaſion or evident cauſe, which was wont otherways to ſtir up the feaveriſh burning, as from taking Cold, Surfeit, drinking of Wine, and the like; and others fell ſick from the Contagion received of others, for as the *effluvia* conſtantly came away from the ſick, when they pierced Bodies prediſpoſed to the like diſtemper, they eaſily excited the hid powers into Act.

As to the third Propoſition, to wit, that the conjunct cauſe of this Diſeaſe, and its formal Reaſon, may be known, we muſt put you in mind of thoſe things, which we have elſewhere delivered concerning the nature of intermitting Feavers; for we ſuppoſe the retorrid and bilous conſtitution of the Blood, as the baſis of this Diſeaſe, by reaſon of which, the alible juice, being ſupplied daily, as it were in a certain meaſure, is not rightly concocted, but by the aſſation or ſcorching, becomes or goes into a fermentative matter, not miſcible with the Blood. When the Blood is filled to a fullneſs with this matter (which happens at ſet intervals of times, becauſe the alible juice is ſupplied as it were by a ſet meaſure) it of its own accord conceives a ſwelling up, and the growing hot or effervelcency being excited, for the carrying away of this matter, cauſes the feaveriſh fit: which ſo long indures, till this feaveriſh matter being inkindled, and as it were burnt in the heart, is wholly diſſipated with ſweat.

From theſe things premiſed, it is made plain, that in this diſtemper, we now diſcourſe of, there are ſome things happen by a peculiar way, from the common kind of intermitting Feavers, and therefore it was noted, and that not undeſervedly, with the appellation of a New Feaver; which are, Firſt, That about the beginning of the Diſeaſe, fits did a long while afflict the ſick, without cold or ſhaking, but with a moſt intenſe heat, thirſt, and cruel vomiting; by which, the ſweat hardly, and for the moſt part partial, and often interrupted, ſucceeded, whereby the fit was not finiſhed but of a long time. The reaſon of which, may be only laid upon the very choleric diſpoſition of the Blood, and being above meaſure ſcorched: For this proceeding from the domineering Sulphur, wholly inhibits the wonted ſourneſs of the Blood, which follows its turgency or ſwelling up, and is wont to ſtir up the cold or ſhivering; and by reaſon of this kind of temper of the Blood, too much roaſting and as it were burning the alible juice, the Blood growing turgid, together with that juice, and being ſtirred up into motion, is inkindled more than it is wont in the heart, and by its deflagration, induces a moſt intenſe and troubleſome heat, with thirſt, to the ſick. Cholerick vomitings, happen not only at the beginning, but in the middle of the fit, by reaſon of the abundance of choler, with which, the Choleduct Veſſels being too much filled, infuſe the inteſtines; which then, a Convulſion being ſtirred up, is eaſily emptied into the Ventricle: ſweat hardly ſucceeds, becauſe the bile abounds more than the ſerum, wherefore the feaveriſh matter being burnt, it is not eaſily ſifted forth by ſweat, but being either mingled with the Blood, cauſes the long effervency, or being carried towards the inteſtines, produces Vomiting, or a Flux. Secondly, This Feaver differs from the vulgar intermitting Feaver, becauſe after the fit was ended, there was no full intermiſſion, even to a remiſſion, but the ſick ſtill remained languiſhing and thirſty; and as to appetite, ſleep, and other accidents, very ill: which indeed hapned, becauſe, by the intenſe heat of the fit, more of the Blood and feaveriſh matter is inkindled, than that its recrements remaining after its deflagration, are able preſently to be diſſipated,

pated, especially, because the sweat, by reason of the dryness of the matter, very hardly succeeds, nor is the feaverish matter enough diluted with the serous *Latex*, to be sifted forth; wherefore, the Blood by its Contagion, in the time of the fit, not being perfectly freed, grows hot still, neither the fit being ended, doth it get any full truce from the Disease: In the mean time, whilst the Blood is urged after this manner, with almost a continual effervency, it differs from a Synochus; because in this, the Sulphureous part of the Blood, being too much carried forth, and as it were inflamed, causes the Feaver by its deflagration; but the continual ebullition, which after this manner comes upon this intermitting Feaver, wholly depends upon the confusion of the not miscible matter, and its hard secretion from the Blood. The Synochus happens like Wine growing hot of its own accord, by reason of its richness, the other conceives its fury, like the same Wine, by reason of some heterogeneous thing poured to it: wherefore we remark, that whilst our Feaver is seen still to be continual, it is not cured by sweat or the Flux of the Belly, altho they frequently and copiously happen: because it depending upon the Blood being depauperated, rather than being inflamed, it continues long, and disposes the sick towards a Cachexie,

3. There is a third reason of difference, by which this Feaver may be distinguished from the common rank of intermitting Feavers, and it is this, that it is easily propagated to others by Contagion; the reason of which is, because here very many bodies are predisposed after the same manner, towards the same distemper, which happens not at another time; wherefore, the meer effluvias from a diseased Body, are able to excite the like effect, in a very fit subject; even as some Beams of Flame enkindle Flame, in a very combustible matter: In the mean time all do not alike contract the Infection of this Feaver, but that some being less prepared or fitted for it, converse with the sick without harm.

4. There is another symptom occurs, not constant to this Feaver, but only happning in some places, that discriminates it not only from the common, but varies its own proper type; to wit, sometimes it happens, this Disease to be accompanied with a Dysenterick distemper; in some cholerick Vomits, and bilous Stools very much infest, and in others Bloody Stools follow, with cruel pains and torments of the Belly. The former I often observed in our Neigbourhood, and the reason of it may be deduced from the highly bilous temper of the Blood: For by reason of this, the adust matter, not to be dissipated by sweat, is copiously sifted into the Liver; then by reason of the choler-carrying Vessels, being filled to a flowing over, it is sent away to the Ventricle, and Intestines. The other Dysenterical distemper, was found only in some places, and there peculiar rather than common, it laid hold only of some sick. The origine of it may be referred to the peculiar dispositions of some Bodies, or vitious provision, also to the site of the place, or condition of the Air; then the Disease is to be suspected, to be thence translated to others, not without the communication of a certain Infection.

There is to be had a double Prognostication concerning this Disease: First, of the Feaver in General, what end it shall have, and when; what it may threaten to the Land: whether it precede not (which is commonly feared) the Plague, or Pestilential Sicknesses. Secondly, The signs ought to be laid down, whereby we are wont to presage health, or danger, in the various cases of the sick.

As to the First, Because we have shown that the Origine of this distemper is not to be fetched from the Contagion of the Air, or its being infected with any venomous Infection, nor from any malignant seeds of Vapours diffused through the Air, but only from the signal bilous temper or disposition of our Bodies, with the Blood being made adust and roasted extremely, by reason of the Summer heats, I think there is no reason of fear, that this Feaver should be carried forth into any thing worse, by the vice of the Air, or might at length grow to be Malignant or Pestilential. But rather (that the season of the Year being changed, and the alteration of our Blood assuredly to be expected) we might fear lest this Feaver, which now imitates the way of an intermitting Feaver, should afterwards pass into a Quartane, the Blood growing into a melancholy temper. Which thing indeed I observed to happen to some already, and I believe, that before the Autumn be fully passed over, will happen to many more.

As to the particular Prognostication, the chiefly notable signs, which occur in the course of this Feaver, and in a manner foretel its condition and event, are of this sort; if the Disease happens in a firm Body, well tempered, and easily perspirable;

if

if vomiting with eaſe ſucceeds, and that the Belly be looſe: if the fit begins with a light ſhivering, and afterwards a moderate heat, with ſweat concludes it, and that the intermiſſion be with ſome tolerable remiſſion; if the Pulſe be ſtrong, the Urine of a flame colour, clear, and with a laudable hypoſtaſis, we may Predict that the Diſeaſe will quickly end without any danger. But if this Feaver be excited in a fat Body, and of a vitious habit, if with troubleſome vomiting, an intolerable thirſt, and fierce heat, long exerciſe the ſick; if to the heat a difficult ſweat, and partial, and often interrupted, and between frequent vomitings ſucceed, and that it ends not in a remiſſion, we may declare, that this Diſeaſe may be long, and of a dangerous iſſue. But if the ſick remain in ſtrength, and the Urine ſhew ſigns of concoction, we need not deſpair of health; eſpecially, if after four or five periods, the Diſeaſe, as it is wont to do, remits of its wonted fierceneſs. Thirdly we obſerve, if this Diſeaſe is excited in an old Body, or others broken with ſickneſſes, or debilitated; if beſides horrid vomitings, there happen ſwoonings, faintings, Deliriums or Lethargic diſtempers; if after many fits, the ſick having loſt their ſtrength, the Diſeaſe remits nothing, but exerciſeth the Blood, with a continual effervency, and that the Vital Spirits are much deſtroyed; if the appetite be loſt, wakings pertinacious, and that they have Convulſive motions, with a weak Pulſe, and Urine troubled, or thick, we judg the matter to be full of danger: yet is not the ſick to be left as deſperate, becauſe the Diſeaſe is not haſty, and kills not ſuddenly, and out of hand; but is drawn out at length, and grants time and occaſions to nature, of recollecting her ſelf, and to the Phyſician, of giving Remedies.

The Therapeutic Indications, which have place in the Cure of this Feaver, are chiefly four. Firſt, That the Blood being now ſcorched, and made too choloric, may be reduced to its due temper. Secondly, That the depravation of the nouriſhable juice, and its alteration into a fermentative matter, may be inhibited, or at leaſt leſſned. Thirdly, That about the declining of the Diſeaſe, the Blood depauperated by a frequent deflagration, and made more impure by the ſuſion or pouring into it the morbifick or aduſt matter, may be reſtored, and rendred as it ſhould be volatile. Fourthly, That the ſymptoms, which chiefly infeſt in the courſe of the Diſeaſe, may be timely helped, by fit Remedies; that theſe intentions may be ſatisfied, I counſel that this following method be uſed.

About the beginning of the Diſeaſe, if the bilous or choloric humor, flowing forth of the choler bearing Veſſels, and being ſuffuſed into the Venticle, cauſe the ſick to be prone to vomiting, let a more plentiful evacuation be procured, by a gentle Emetic in the time of the fit: The opening of a Vein, and Purging, ought not to be adminiſtred, unleſs between the fits: for whilſt the Blood grows mainly hot, or is reſolved into ſweat, Nature ought not to be called back from the Work begun, nor her endeavours to be diſturbed, by the preſcriptions of Phyſicians; wherefore, after the fit being paſt, and the ſweat throughly finiſhed, a Purging may be inſtituted, by a gentle Cathartic, and the ſame afterwards ſometimes repeated, on the like occaſion: for by this method, not only the proviſion of the excrementitious matter, is brought away, from the firſt paſſages, but chiefly the choler-bearing Veſſels being emptied, the choler is copiouſly drawn forth from the maſs of Blood, and by that means the Blood is reſtored to its natural Craſis or diſpoſition. The Letting of Blood, if it be indicated, ſhould be performed preſently after the beginning; for ſo its Liquor being too turgent or ſwelling up, is eventilated, whereby both the nutritious juice is leſs perverted, and the fit urging, it burns forth with a leſs heat, together with the morbifick matter: but otherwiſe, if a Vein be opened after a long ſickneſs, when the Blood being made poorer, and more watry, more of the morbific matter is heaped together, and does not rightly concoct, and ſift it forth, it detracts much from the ſtrength of Nature, and nothing from the power of the Diſeaſe. In the interval of the fits, when there is no place for opening a Vein, nor Purging, let the Belly be kept looſe, by the conſtant uſe of Clyſters; alſo digeſtive Remedies, of acetous or ſaline Liquors and Powders, are to be exhibited; of which ſort are, Cream of Tartar, fixed Salts of Herbs, Tartar Vitriolate, Harts-horn burnt, Spirit of Vitriol, and Sal, &c. for theſe reſtore the loſt, or ſleepy ferments of the Viſcera, purifie the Blood by fuſing it, alſo ſeparate the morbific matter, and as it were precipitate it: alſo, at this time, between, if pertinatious waking infeſt the ſick, and overthrow their ſtrength, it may be lawful to adminiſter anodyne, and gentle narcotic Remedies; but never in the fit: for then they greatly hinder the ſubduing, and ſifting forth of the feaveriſh matter, and draw out in length the fit that would end ſooner. Theſe

Theſe things are to be done about the interſtitia, or intervals of the fits; but whilſt the fit is urgent, altho the ſick then chiefly ſend for, and call upon Phyſicans, yet at this time their preſcripts are limited to a narrower ſpace: If Vomiting (notwithſtanding an Emetic being given) ſtill infeſt, it may be more freely provoked, either by ſimple Poſſet Drink, or with bitter Herbs boyled in it: But let the chiefeſt means of help be, in temperating the heat and thirſt, which moſt grievouſly torments the ſick in this Feaver: For whilſt the Blood growing hot, with the morbific matter, and being inkindled in the Heart, leaps forth into the Lungs, ſtirs up there a cruel Inflamation, which requires a profuſion of a cold humor as it were for the extinguiſhing the Flame; wherefore they greedily deſire without any meaſure drink, for want of which the ſick are almoſt killed with too great heat, and their Blood being almoſt wholly rarified into flame and fume, the thrid of Circulation is hardly continued; wherefore, drink ought to be wholly granted, to thoſe in Feavers: which however, if it be taken in too large a quantity, it at firſt more diſturbs the eſtuating Blood, and at length brings confuſion to the feaveriſh matter, begun to be ſeparated; that from thence, the Work of ſubaction and ſecretion is longer protacted, and the fit is made longer: alſo, beſides, large drinking cauſes troubles in the Ventricle, and by diſturbing it, and often provoking Vomiting, hinders the breathing forth, and calls inward the ſweat breaking forth, or perhaps already broke forth: wherefore, at firſt, the heat of the Feaver being inkindled, altho the ſick be very thirſty, let them only ſip a little, and abſtain from drink as much as they can; afterwards, when the matter being burnt, and ſubdued, begins to be diſſipated by ſweat, they may be more freely indulged as to this, for ſo the ſweating is greatly helped, and the fit is ſooner finiſhed: as to the nature of the Drink, let them take ſometimes Poſſet Drink, ſometimes Small Beer, or Barly Water, and ſometimes ſimple Water, or ſharpned with the juice of Lemons: In this caſe, the uſe of Sal Prunellæ is deſervedly praiſed, to be given in every Liquor; for this, with its nitroſity, wonderfully allays the raging Blood, and potently moves ſweats, I have often obſerved, in the midſt of a fit, the ſick wont to fall into a ſwoon, or ſyncopy, to whom preſently they give Cordials or hot Waters that much increaſe the violence of the Feaver, and bring forth more troubles than uſual, that the fit is more difficultly finiſhed: But theſe faintings, for the moſt part, happen, either from a bilous humor ſuffuſed in the Ventricle, or by reaſon of the ſweat ſuddenly, breaking forth; and againſt theſe I always found the moſt preſent Remedy, that either a feather being put down the throat, Vomiting may be provoked, or that Liquor being plentifully drunk, a ſweat may be again raiſed up: alſo, in the whole courſe of this Feaver, I am wont never to give any Cordials, or alexiteriums.

The Dyet in this Feaver ought to be only ſlender, and not nouriſhing, all ſorts of Fleſh, or any thing prepared of them, are wholly to be avoided; for as theſe abound with Sulphur, they give a more plentiful food (as Oyl poured on Flame) to the hot or enkindled Blood: beſides, nothing ſpiritous, as ſtrong Waters, ſtrong Beer, or Wine, is to be yielded to; but Decoctions, or Broths of Oat-meal, or Barly, altered with cooling Herbs, are chiefly to be uſed; alſo Poſſet Drink, and ſmall Beer, or Whey, is to be given them at their pleaſure: for by this means, when a very ſlender and watry nouriſhing juice, is conveyed to the maſs of Blood, the ſoluted Particles of Sulphur, burn forth ſooner, and with the leſs tumult; alſo the recrements of the aduſt matter, are more eaſily carried from the boſom of the Blood: but if on the contrary, a more rich or plentiful nouriſhment be adminiſtred, the effervency of the Blood is thereby very much augmented, and the Blood is more infected, by the confuſion or pouring in of the aduſt matter.

After that the Blood being much burnt forth by frequent fits, and the Feaver being in its declination, remits of its fervor and fierceneſs, you muſt take heed, leſt the ſick at length growing well, fall not into a Cachexie, or Scorbutic Diſtemper: for the diſpoſition of the Viſcera being hurt, and the Blood very much depauperated, the alible juice, though not ſcorched ſo as at firſt, is not however rightly concocted, and ripened into perfect Blood: but by reaſon of the want of tranſpiration, the ſerous excrements, being imbued with a fixed ſalt, are greatly heaped together, and now fixed in the Bowels, now in the extreme parts, bring forth various Diſtempers. Wherefore in a long languiſhing of the ſick, or otherwiſe for the ſake of being ſooner well, Remedies ſhould be given them, which volatiliſe the Blood, or hinder the ſtuffings of the Viſcera, or if ſtuffed, may open them, and their ferments as if extinct, reſtore: for this uſe, thoſe Remedies and Preparations chiefly help, which are commonly

monly called Digeſtives and Antiſcorbuticks; with which being timely adminiſtred, I have known very many weak, pale, and as it were without Blood, ſuddenly to recover a livelineſs and vigor.

The Deſcription of a Catarrhal Feaver Epidemical in the middle of the Spring, in the Year 1658. *taken the fourth of* June.

AN equally intenſe Froſt followed the next Winter, the immoderate heat of the foregoing Summer, ſo that no one living could remember ſuch a Year, for either exceſs both of heat and cold. From the Ides of *December*, almoſt to the vernal Equinox, the Earth was covered with ſnow, and the North wind conſtantly blowing, all things without doors were frozen: alſo, afterwards, from the beginning of the Spring, almoſt to the beginning of *June*, the ſame Wind ſtill blowing, the ſeaſon was more like Winter than Spring; unleſs now and then a hot day came between. During the Winter (unleſs that a Quartan Feaver contracted in Autumn infeſted ſome) among our Countrimen, there was a moderate ſtate of health, and freedom from all popular Diſeaſes. The Spring coming on, an intermitting Tertian (as uſed to do every year before) fell upon ſome. About the end of *April*, ſuddenly a Diſtemper aroſe, as if ſent by ſome blaſt of the Stars, which laid hold on very many together: that in ſome Towns, in the ſpace of a Week, above a thouſand people fell ſick together. The particular ſymptom of this Diſeaſe, and which firſt invaded the ſick, was a troubleſome Cough, with great ſpitting, alſo a Catarrh falling down on the palat, throat, and noſtrils; alſo it was accompanied with a feaveriſh Diſtemper, joyned with heat and thirſt, want of appetite, a ſpontaneous wearineſs, and a grievous pain in the Back and Limbs: which Feaver however was more remiſs in ſome, that they could go abroad, and follow their affairs in the time of their ſickneſs, but complaining in the mean time, of want of ſtrength, and of languiſhing, a loathing of food, a Cough, and a Catarrh: But in ſome a very hot Diſtemper plainly appeared, that being thrown into Bed they were troubled with burning, thirſt, waking, hoarſneſs, and coughing, almoſt continual; ſomtimes there came upon this a bleeding at Noſe, and in ſome a bloody ſpittle, and frequently a Bloody Flux, ſuch as were indued with an infirm Body, or men of a more declining Age, that were taken with this Diſeaſe, not a few died of it; but the more ſtrong, and almoſt all of an healthful conſtitution recovered: thoſe who falling ſick of this Diſeaſe, and died, for the moſt part died by reaſon of the ſtrength being leiſurely waſted, and a ſerous heap more and more gathered together in the Breaſt, with the Feaver being increaſed, and a difficulty of breath, like thoſe ſick of an Hectic Feaver. Concerning this Diſeaſe, we are to inquire, what procatartic cauſe it had; that it ſhould ariſe in the middle of the Spring ſuddenly, and that the third part of Mankind almoſt, ſhould be diſtempered with the ſame, in the ſpace of a Month: then the ſigns and ſymptoms being carefully collated, the formal reaſon of this Diſeaſe, alſo its Criſis and way of Cure ought to be aſſigned.

That the Northern Wind is moſt apt to produce Catarrhs, beſides the teſtimony of *Hippocrates*, common experience doth make known: but why Catarrhs did not ſpread, at leaſt in ſome peculiar places, all the Winter and Spring, but only in one months ſpace, and then joyned with a Feaver, this Diſtemper ſhould become Epidemical, doth not ſo plainly appear. I know many deduce the cauſe from the unequal temper of the Air, at that time; which altho for the moſt part very cold, yet the North Wind ſometimes leſſening, there would be a day or two very hot between: wherefore, from this occaſion, as from cold taken after the heat, men ſhould commonly fall ſick: But indeed, for the exciting the Diſtemper, ſo ſuddenly riſing, and commonly ſpreading, there is required, beſides ſuch an occaſion, a great foregoing cauſe or prediſpoſition, tho the other might ſuffice perhaps, for an evident cauſe, for to diſtemper them with this ſickneſs; for we ought to ſuppoſe, that almoſt all men were prone to the receiving this Diſeaſe, otherwiſe no evident cauſe could have exerciſed its power ſo potently on ſo many, wherefore, it ſeems very likely, that this Diſeaſe had its Origine from the intemperance and great inordination of the year: and as the Autumnal intermitting Feaver before deſcribed, was the product of the preceding immoderate heat, ſo this Catarrhal Feaver, depended altogether upon the following part of the year, being ſo extremely cold: For the Blood being now throughly roaſted by the very hot Summer, and prone to the Feaver before deſcribed,

then being made more souriſh by the Autumn urging it, and apt for a Quartan Feaver, afterwards being a little eventilated by reaſon of the ſtrong cold of the Winter, and hindred from its due perſpiration, retained yet its Dyſcraſie, or evil diſpoſition, and readily broke forth on the firſt occaſion given: wherefore, when the Blood, in the middle of the Spring, (as the juice of Vegetables) being made more lively, and alſo begun to flower and grow rank, by reaſon of the ſtoppage being ſtill continued, was ſtraitned in its Circulation, and eaſily made prone to a feaveriſh effervescency: and as the ſerous Water redounding in the Blood, could not evaporate outwardly, becauſe of the Pores being ſtill ſtraitned by the cold, reſtagnating within, and chiefly falling upon the Lungs, (where it might be moved about, inſtead of an outward breathing forth) excited the ſo frequent and troubleſom Cough.

The Original therefore, and formal Reaſon of this Diſeaſe, are founded chiefly on two things, to wit, that there together hapned a greater effervescency of the Blood than uſual, from the coming on of the Spring ſeaſon, and alſo a ſtoppage, or great conſtriction of the Pores, excited by the too great cold of the foregoing ſeaſon; that therefore there was not a free ſpace granted to the Blood, flowring or luxuriating in the Veſſels: The buſineſs being after the ſame manner, as if Wine begun to grow hot, ſhould be put up into cloſe ſhut Veſſels, for by this means, either the Veſſels, or the Liquor, were in danger to be loſt.

Wherefore, that we may contract the thing in ſhort, the cauſe that this Diſeaſe begun in the middle of the Spring, having preſently ſpread largely, ſeiſed very many, was not the blaſt of a malignant Air, whereby the ſick were diſtempered, as if ſtruck with a blaſting, but that at this time, the Blood being inſpired by the conſtitution of the Spring, and ſo luxuriating, and apt to grow hot, was contracted or ſtraitned in its motion, and, the effluvias being conſtrained inwardly, could not be ſufficiently eventilated or cooled. In every year, tho temperate, it is uſual in the Spring and Autumn for ſome Epidemical Diſeaſes to reign, becauſe at this time, the Blood being as it were reſtored, flowers anew; and therefore, intermitting Feavers, and ſometimes the Small Pox ordinarily ſpread in this ſeaſon; wherefore, 'tis no wonder, after a great unequal conſtitution of the year, and not natural, when in this Spring, the Blood boyling up more lively within the Veſſels, by reaſon of tranſpiration being hindred, could not be freely circulated, and ſufficiently eventilated, if for that cauſe, great diſorders follow, and from this moſt common cauſe, a diſtemper greatly Epidemical ſhould be excited.

As to the ſymptoms joyned with this Diſeaſe, a feaveriſh intemperature, and whatſoever belongs to this, the heat of the *Præcordia*, thirſt, a ſpontaneous wearineſs, pain in the Head, Loyns, and Limbs, were induced from the Blood growing hot, and not ſufficiently eventilated: hence in many, a part of the thinner Blood being heated, and the reſt of the Liquor being only driven into confuſion, a ſimple Synochus, or of more days was induced, and this for the moſt part ceaſed within a few days: But in ſome endued with a vitious diſpoſition of Blood, or evil habit of Body, this kind of Feaver, ariſing by reaſon of the ſame cauſe, quickly paſſed into a very dangerous Putrid Feaver, and often Mortal.

The Cough accompanying this Feaver with a Catarrh, draws its Origine from a ſerous humor heaped up together in the Blood, by reaſon of tranſpiration being hindred for a long time, and then an effervescency being riſen, dropping forth more from the little Arteries, gaping within: for when the Pores are conſtrained, the ſuperfluous ſeroſities in the Blood, being wont to evaporate outwardly, are poured forth on the Lungs, by a proper caſtration or cleanſing of the Blood, wherefore, by taking cold, (as they commonly term it) that is, from tranſpiration outwardly being hindred, the Cough for the moſt part is ſtirred up: And for a foregoing cauſe to this Diſtemper, the flowing forth of the ſerum into the maſs of Blood, hath for the moſt part the chief place; for, from the long cold hindring the ſcorching of the Blood, or the proviſion of the bile, and prohibiting the breathing forth of the watry humor, there was a neceſſity, that very much of the ſerous humor ſhould be heaped up in the Blood: wherefore, when the Blood flowring in the Spring, conceived an heat, the flowing forth of the ſerum, and a pouring of it on the interior parts, was wont to cauſe firſt the Cough, as the proper ſymptom of this Diſeaſe: and thoſe, whoſe Blood was more diluted by the mixtion of the ſerum, and who were greatly obnoxious to the Cough and a Rheumatic Diſtemper, were cured with leſs trouble of the feaveriſh Diſtemper.

The

the Prognoſtick of this Diſeaſe, concerning private perſons, is for the moſt part eaſie, that one may deliver the event, from the firſt aſſault; for if this ſickneſs be excited in a ſtrong Body, and healthful before, and that the feaveriſh Diſtemper be moderate, and without any grievous and horrid ſymptom, the buſineſs is free from danger, and the Diſtemper is to be accounted but of light moment, as that commonly is of catching cold, neither needs a Phyſician be conſulted, nor Remedies, unleſs trivial and ordinary, be adminiſtred: But if this Diſtemper happens in a weak and ſickly Body, with an evil proviſion, or that the Feaver being carried into a Putrid Feaver, or the Cough growing grievous, induces difficult breathing, and as it were a tabid or Conſumptive diſpoſition, the event of the Diſeaſe is much to be ſuſpected, and often terminates in Death. The common Prognoſtic, that was taken from hence, concerning the future ſtate of the year, conteins nothing to be feared, or ominates any great ill; by reaſon of the unequal intemperance of the year, the great heats, and then exceſſive cold, we might fear Diſeaſes to ariſe from the Dyſcraſie of the Blood, yet from the preſent condition, we need neither ſuſpect any noted depravation of the Air, or Infection with poyſonous breaths; that from thence may be had any judgment of the Plague, or Malignant Diſeaſe to be at hand.

As to what belongs to the Cure, when this Diſeaſe is more lightly inflicted, its Cure for the moſt part is left to Nature: for this Feaver, when it is only a ſimple Synochus, is wont to be cured within a few days by ſweat: wherefore, by a copious ſweating, for the moſt part about the third or fourth day, the heat, and thirſt, the wearineſs, and heavy pains are allayed; then the Cough being ſomewhat longer protracted, by little and little afterwards remits, and at length the ſick leiſurely grow well; if this Diſeaſe hath rooted it ſelf more deeply, there is need of fit Remedies, and an exact method of curing, the Feaver growing worſe is to be healed, according to the Rules to be obſerved in a Putrid Feaver: but nevertheleſs with this difference, that, becauſe tranſpiration being hindred, and the ſuffuſion of the ſerous humor on the Lungs, are chiefly in fault, therefore Diaphoretic Remedies, and thoſe called pectoral are of more frequent uſe, for theſe reſtrain the flowing forth of the ſerum, from the Veſſels within, or by opening the Pores convey it forth of doors; or precipitating it from the boſom of the Blood, ſend it forth by the urinary paſſages; therefore the method of Medicine for this Diſeaſe, being brought into the worſer ſtate, reſpects both the feaveriſh intemperance, for the ſake of curing which you are to be directed, according to the intentions ſhewn in the Putrid Feaver, and alſo the Rheumatic Diſtemper, which however let it be ſecondary, and not every expectorating Remedy, or thoſe uſed againſt a Cough are to be admitted, but of that kind only which do not increaſe the Feaver: the forms of theſe, and the means of curing, are to be ſought from the precepts, delivered generally for the Cure of the Putrid Feaver, and of the Cough; the helps, which now, by frequent experience, are commonly ſaid to bring Cure chiefly in this Diſeaſe, are ſweating, or the provoking of ſweat, and letting of Blood: for the Veſſels being emptied by this or that means, both the immoderate heat of the Blood, and the abundance of the ſerum, are reſtrained.

A Deſcription of an Epidemical Feaver ariſing about the beginning of Autumn 1658. *taken the* 13*th of* September.

THE vernal Feaver but now deſcribed, did not laſt longer than ſix weeks, that it plainly was ſeen, that it was only a more light flowring of the Blood, which ſwelling up in the Spring, and at the ſame time ſtreightned in ſpace, for want of ventilation, moſt impetuouſly boyled up, like new Wine cloſe ſhut up in Bottles, and then ceaſed of it ſelf. Yet from thence, as neither the year, ſo neither our Blood did recover its due temperature, and ſo another tinder or neſt for a new Feaver, was quickly gathered together. Becauſe after the Summer ſolſtice, the North wind ſtill blowing, a cold ſeaſon remained for a long while; ſo that the Fruit and Corn this year, was feared by the Husbandmen, would ſcarce be throughly ripened; but after this, a little before the beginning of July, a moſt fierce heat followed, for ſeveral days: and when the Dog days were begun, the Air grew moſt cruelly hot, that one could ſcarce indure the open Air. By reaſon of this heat and cold in exceſs, the temperature of this year was very unequal: wherefore, there was a neceſſity, for our Blood to be now fixed, and as it were congealed, now too much roaſted, and ſo perverted from its natural diſpoſition, to a ſcorched, and melancholly temper; alſo it

came to paſs that the Pores of the skin were much altered from their right conſtitution, that by that means, an inſenſible tranſpiration could not be performed, after the wonted manner.

From the time that the former Feaver ceaſed, almoſt to the end of the Dog days, there was a ſtate of health, and free from all popular Diſeaſes; but then a few here and there among the Villages, and in leſſer places, firſt fell ſick; but afterwards, about the end of *Auguſt*, a new Feaver ſuddenly ariſing, began to ſpread through whole Regions, every-where round about us; alſo, this as the other which ſpread the laſt Autumn, raged chiefly in Country Houſes and Villages; but in the mean time, few of the Inhabitants of the greater Towns and Cities fell ſick. At the ſame time, in other Regions, ſituate at a diſtance from us, yea, almoſt throughout *England*, the Epidemical Feaver was ſaid to rage; and in ſome other places, to be far more deadly, than it was about our Country. Perhaps the Idea of this Feaver now reigning, had not the proviſion of its ſymptoms alike in all places, or was noted wholly with the ſame appearances and accidents: yet whatever it ſhewed in our parts, as to its nature, I ſhall briefly and ſuccinctly add, from our own proper obſervation, or what I had learnt, being communicated from others.

About the beginning of this Diſeaſe, its figure was wandring, and very uncertain; becauſe in ſome there was a continual fervor, in others it was intermitting, being renewed by ſet fits; but at this time it hapned to very many, as a pathognomic ſymptom, that they were ill in their brain, and nervous ſtock, that preſently from the very beginning of this Feaver, almoſt all complained of their head being grievouſly diſtempered: For a cruel headach infeſted ſome, and hardneſs of hearing, with a noiſe in the ears troubled others, but to moſt was wont to happen, either a ſtupidneſs, and heavy ſleepineſs, with a vertiginous Diſtemper, or pertinacious wakings, with a delirium, and diſtractions of the animal ſpirits. I have obſerved in ſome, that on the firſt or ſecond day of their ſickneſs, that little broad and red ſpots, like to the meaſles, have leiſurely broke forth in the whole body, which being ſhortly vaniſhed, the Feaver preſently became ſtronger, and eſpecially the Diſtempers of the head, far more grievous. From thence a benumedneſs of the ſenſes, and a ſleepineſs fell upon ſome for many days, that they lay a long while as if dying, without ſpeaking, or knowledg of their friends. I knew others to have fallen from hence into a Lethargy, and others caſt into an Apoplexie, and ſome into a Phrenſie, and Delirium. Of theſe, the younger, and ſtrong men (yet not without a long languiſhment, and doubtful recovery) moſt of them eſcaped; in the mean time, old men, or other ways weak and ſickly, generally died. Thoſe who fell ſick with the Feaver, as it were continual, with thoſe notes of malignity, were more rare, and the diſtempered were only ſporadically, in ſome houſes only. But the ſickneſs which moſt commonly ſpread about us, fell upon moſt, and tho it cruelly raged, it ſeemed to imitate an intermitting Feaver, to wit, either a Tertian, or a Quotidian: for that the ſick had fits, either every day, or (which I more often obſerved) every other day, which infeſted them grievouſly, and a long while, with cold, heat, and ſweat, ſucceeding in order: but theſe kind of fits, as alſo the courſe of the whole Diſeaſe, were wont to be noted with diverſity, according to the age and temper of the ſick; and with various concourſe of ſymptoms, and accidents. Yet this was common to moſt of (I had like to have ſaid all) the ſick that together with the Feaver, they were troubled with Cephalic Diſtempers.

When therefore any one was troubled with this Diſeaſe, (whether the ſickneſs was excited from an evident cauſe, or Contagion, or without any manifeſt occaſion) its coming betrayed it ſelf, by a pain in the head, and often in the loyns, with thirſt, want of appetite, ſpontaneous wearineſs, and heat tho not ſtrong: if it hapned in a young Body of a florid Blood, and more hot temper, the fits wanted the cold and ſhivering, about its beginning, but they were very troubleſome, and ſharp, with long heat: The ſick were often troubled with vomiting, and their head aked cruelly for the moſt part; ſweat difficulty ſucceeded, which being often partial and quickly broke off, rarely cured the fit, but when the ſweat failed, they grew hot again, that ſcarce in 18 or 24 hours the fit was finiſhed in ſome. In the mean time, from the Blood being very fervent, the phantaſie was diſturbed, that oftentimes a Delirium, abſurd or idle talking, wakings, and high inquietudes were ſtirred up during the fit; but the ſame being finiſhed, in the time between, ſtill a troubleſome thirſt, a ſlow heat, languor of ſpirits, and great debility of ſtrength, with an headach, and

a vertiginous Diſtemper, for the moſt part moleſted them. It was rarely found, for any to find themſelves indifferently well, as in a common Tertian, between the fits. About the beginning of the Diſeaſe, the feaveriſh fierceneſſes were ſomewhat more mild, which afterwards at every turn, leiſurely grew worſe, and then began with cold and ſhaking; to which nevertheleſs, after a long and very troubleſome heat, ſweat very hardly ſucceeded in moſt, ſo that the fit rarely ended in its due temper. Within ſix or ſeven periods, the ſtrength of the ſick was much caſt down, that being made languid, and weak, they had an hard task to ſtruggle with the Diſeaſe: becauſe unleſs Nature were ſuccoured by Art, the Feaver ſtill prevailed, and rarely or never in a ſhort time, was it cured by a Criſis, or leiſurely remitted; but it brought the ſick into great ſtreights, by its long ſiege, and ſtill perſiſting, till the Blood being by its frequent deflagration made very liveleſs and watery, was unable to grow too hot in the Veſſels of its own accord, or to be inkindled more plentifully in the heart, and then oftentimes, became ſo dead, and wanting of ſpirits, that, being inſufficient for the continuing of the Vital Lamp, it brought in Death. But ſometimes the maſs of Blood being depraved, and made poor, by this Diſeaſe, was able (tho hardly) to continue the half extinct Vital Fire, and to renew it by little and little, with ſpirit and vigor, in a long time: yet in the mean time, after the heighth of this Diſeaſe, when the Blood being made more weak and impure, could not expel forth of doors this feaveriſh matter, or aduſt recrements, by a critical motion, it often transferred it to the Brain; and therefore about the height of this Feaver, a torpor, and ſtupidity of ſpirits, ſleepineſs, vertigo, tingling of the ears, tremblings, and convulſive motions, with a great oppreſſion of the whole animal faculty, were moſt often induced.

Men of a more cold temperament, or in years, who were taken with this Diſeaſe, altho they were but little feaveriſh, were wont however to be in greater danger of Life; becauſe, in theſe, beſides the diſpoſition of the Blood, not eaſily reducible, alſo what was gathered together in the fits, that was extraneous and not to be mixed, was hardly ſubdued, and difficultly ſifted forth of the maſs of Blood; wherefore, both the Blood was ſtill more notably depraved in its Craſis, and in every fit more infected by the impure mixture: Moreover the nervous Liquor was greatly perverted from its due temper, and defiled moſt badly, by the aduſt recrements continually poured on the Brain. Therefore, when old men, melancholic, or otherways ſickly perſons, fell into this Feaver, they became, preſently after its firſt aſſault, ſtupified, and for the moſt part vertiginous: Tho in the fits, the heat was not very ſharp and piercing, they were however very unquiet, and ſtill toſſing about, oftentimes they talked idly, and at random; after a long burning, either no ſweat, or only partial, and often broke off, followed; whereby the fit was not fully helped, but that in the whole intervals, the ſick were thirſty, and remained very ill, with a drineſs of the mouth, a ſcurfineſs of the Tongue, and a ſuffuſion of a viſcous filth. After ſome fits, their ſtrength being exceedingly caſt down; they were wholly fixed to their Beds, or riſe only for a little while, could ſcarce ſtand or ſet a foot before another, to move from place to place, or able to walk: in the mean time, they laboured with a languiſhment, a difficult breathing, a nummedneſs of ſenſes, and a great debility of the whole nervous ſtock: The Urine in moſt was highly red, of a more deep colour, and of a thicker conſiſtency, than in a common Tertian: The Pulſe, whilſt the ſtrength was not wholly caſt down, for the moſt part was ſtrong and equal; afterwards, when the ſick became very languiſhing, it was weak and unequal, and oftentimes intermitting; to which alſo, conſtructures of the tendons, and convulſive motions in the wriſts, being joyned, were for the moſt part prognoſticks of Death. Thoſe who leiſurely being debilitated, declined towards Death, ſome little time before they died, lay for the moſt part without ſpeaking, or knowing thoſe about them, as it were ſtupid: and it rarely hapned in this Feaver, that any one about to die, was ſo perfect in their memory and intellect, as to diſpoſe of their Family affairs, or to take leave of their friends. But it hapned to thoſe who eſcaped, from a deep languiſhment and almoſt deſperate condition, not quickly, or ſuddenly to recover, from their manifeſt evil diſpoſition, but lying a long while wavering, ſtupified, and without ſtrength, that Nature at length, not but after a doubtful and difficult ſtrife, got indeed ſcarcely the better of the Diſeaſe, and then recovered ſtrength by degrees, and health lingringly and ſlowly.

If

If the nature, and formal reaſon of this Epidemical Feaver but now deſcribed, be demanded, we ſay, that this (as that of the former year) properly is an intermitting Feaver: for what commonly ſpread bore that figure; altho ſome here and there, more rarely, had it continual, which we ſhall by the way mention by and by. The ſeed plot or ſeminary of this, need not be derived from the air, being infected with any Infection, but rather its leading cauſe is to be ſought, from the undue conſtitution of the year, and from thence an indiſpoſition of our Blood being acquired. Becauſe, in the Spring and Autumn, intermitting Feavers have yearly ſprung up and increaſed; to wit, for that our Blood, like to the juice of Vegetables, is wont to be more lively moved than uſual, and to flower at thoſe times. Wherefore if the maſs of Blood, by reaſon of the foregoing ſeaſon, of the Summer, or Winter, ſhould be altered from its due temperature, and ſhould contract either a ſharp or atrabilous diſpoſition, or of any other kind, its evil diſpoſitions begun before, are chiefly ripened about the Equinoxes; to wit, when the Blood more freely fermenting (if that it hath departed from its natural diſpoſition) doth not ſo eaſily ſanguifie, but that it will be apt to pervert the alible juice, poured to it, into an extraneous and feaveriſh matter. When therefore this year, had not very much declined from a right conſtitution, (as not only the Dog-days going before but) that the two ſolſtices, and the equinoxes, were wholly intemperate, it was no wonder if intermitting Feavers, more frequent than uſual, and thoſe noted with ſome unuſual ſymptoms, did increaſe about the Autumn. That therefore an intermitting Epidemical Feaver raged at this time, I judg it not to be attributed to the fault of the preſent Air, but to the irregularities of the foregoing ſeaſon: yet from what cauſes and occaſions, ſome ſymptoms proper to this Feaver, and diſtinct from the common rule of intermitting Feavers, did ariſe, will be worth our Inquiry. I have already ſaid, that the proviſion, that made this Feaver ſo deadly, conſiſted in two things, chiefly, *viz.* the temper of the year, now extremely cold, then upon it very hot, then that it had variouſly perverted the diſpoſition of our Blood, and had diſtempered the pores of the skin, with an undue conſtitution. According to the reaſons taken from either, I ſhall endeavour to explicate the accidents of this Diſeaſe, and to aſſign the cauſes of its appearance.

1. Firſt, We ſhall obſerve, that the type of this Feaver was various, to wit, in ſome with a continual heat, in others with an eruption of ſpots, but in moſt intermitting, and like a Tertian, and ſometimes (tho rarely) a Quotidian, repeating the fits every day, or every other day: the cauſe of this diverſity, we impute to the more ſtrong and potent morbific procatarxy of this year, which produced in the Autumn, a more common intermitting Feaver than it was wont, wherefore, in ſome (perhaps indued with a more praved habit of Body) it ſtirred up Feavers ſomething malignant; and in whom it cauſed intermitting Feavers, according to the wonted manner of the ſeaſon, it made them to be noted with a peculiar appearance of ſymptoms.

2. Thoſe taken at this time, with the Epidemical Feaver (whether it was continual or intermitting) ſuffered preſently evil Diſtempers of the head, *viz.* now they were wont to be infeſted with cruel head-ach, now with a ſtupor, or too great diſtraction of the Animal Spirits. The reaſon of this is, that the nervous juice, as well as the Blood, by reaſon of the intemperance of the year, was much altered from its due Craſis or Diſpoſition, *viz.* by nature ſweet and ſpirituous, and was become now heavy, and almoſt lifeleſs, now ſharp, and too much pungitive. Beſides, alſo, the maſs it ſelf of the Blood, very much contributed to this evil; for whilſt it grew hot, the vaporous effluvia, which ought to have been diſperſed outwardly, by reaſon of the Pores being ſhut up, were poured upon the Brain, and membranes of the head: and by reaſon of this kind of ſtopping, impreſſed almoſt on all, ſweat hardly, and not but partial, and often interrupted, ſucceded in the fits; hence alſo in the height of the Diſeaſe, a perfect Criſis, or ſpontaneous, rarely or never hapned to Cure it; but inſtead of this, if the buſineſs was committed to Nature, the aduſt matter, or recrements gathered together in the Blood, were transferred to the head, and there raiſed up now the ſleepy evil, now Phrenſies, and thoſe long and ſtubborn.

3. That the fits ſometimes begun without cold or ſhivering, but with a troubleſome heat, and were prolonged with a difficult ſweat, partial, and often interrupted

rupted; then foraſmuch as the ſame being finiſhed, the ſick began again to wax hot, that the fits were not finiſhed without a long evaporation of a dry breath; the cauſe was, the too ſharp and bilous diſpoſition of the Blood, whereby when it grew turgid, it was ſtuffed rather with aduſt Salt and Sulphur, than a ſerous juice, and preſently conceived an inkindling, without any previous Flux of nitrous matter; and therefore for want of ſerum, and by reaſon of the Pores being ſhut up, its deflagration was continued for a long time, almoſt only with a dry exhalation, and ſcarce at laſt ended in a remiſſion. And therefore the interſtitia of the fits were moſt troubleſome with heat, and thirſt, Head-ach, Vertigo, and other Diſtempers: becauſe the feaveriſh matter, being heaped up in the Blood, was not all diſperſed by the ſeveral fits, but part of it being left after the fit, as it were extraneous and not miſcible, induced almoſt a continual burning.

4. It was obſerved, that thoſe diſtempered with this Feaver, preſently loſt their ſtrength and fleſh, that after a fit or two, they panted for breath, and being very weak, were not able to ſtand or go, without being led; when it is an uſual thing, in an intermitting Feaver that is common, for the Patient to be very lively and cheerful, between the fits: the reaſon of the difference is, becauſe in this Feaver, the maſs of the Blood is both more depraved by the impure mixture of the degenerate juice, and eſpecially, that the ſame is more perverted from its natural diſpoſition, and therefore, when it boyls up leſs out of the fits, it yet ferments not rightly, and equally in the boſom of the heart: wherefore, when by any more quick motion, or agitation of the Body, the Blood is carried more impetuouſly into the boſom of the heart, becauſe it is not there preſently inkindled, it both leaps forth of doors, and by its ſtagnation, cauſes the oppreſſion of the heart, and great weakning of the Vital Spirits. By reaſon of this kind of dyſcraſie of the Blood, to wit, whereby it is made more unfit for due Fermentation and inkindling in the heart, alſo ſome Beaſts, and eſpecially Horſes, in the Spring time, are made hard breathed, and very unapt to any rapid motion.

5. Laſtly, We are to inquire, concerning this Feaver, wherefore it ſpread chiefly in Villages, in leſſer Towns, and the Country, when Cities and greater Towns were leſs troubled with it. It might ſeem that this Diſtemper, ſhould be excited from marſhie Fogs, and other hurtful Vapours, plentifully heaped together in this or that Tract of the Air: but there is a better reaſon, for that the inhabitants of theſe kind of places, being more expoſed to the Spring cold, and then to the Summer heats, might have contracted a greater Dyſcraſie of the Blood, and ſo a more apt diſpoſition to this Feaver. For in truth, the Inhabitants of the Country, could ſcarce go out of their houſes, but they were expoſed to the Sun's Beams, or the fervor of the heated Air. Beſides, Countrymen, Husbandmen, and ſuch as were accuſtomed to Labours (among whom this Feaver chiefly raged) from their immoderate toyl in the Sun, or open Air, alſo uſing a bad and ſharp Dyet, ſooner acquired an aduſt and torrid diſpoſition of the Blood, and ſo more apt for this Diſeaſe, than Citizens and Townſmen, who lived an idle life, and enjoyed wholſome food, and moſtly continued within doors, and in refrigerating ſhades. We may believe this aſſertion, for that not only the Epidemical Feaver now raging, but alſo another of the Autumn before, excited by reaſon of the evil diſpoſition of the Blood, increaſed chiefly among the Countrymen, and inhabitants of the Country: but the popular Feaver, which aroſe in the middle of the Spring, depending chiefly upon tranſpiration being hindred, moſtly infeſted Citizens and the Inhabitants of Towns; whilſt ruſtical men, that were wont, by Labour and Exerciſe, to procure a more free breathing forth, remained free.

The general Prognoſtication of this Diſeaſe, ſeems only to ominate or foretel, the like evil almoſt to follow this, as followed the Epidemical Feaver of the former Autumn, to wit, (the Augury being taken rather from the intemperance of our Blood, than from the evil of the Air) not the Peſt, but a Quartane Feaver might be feared to come upon it. As to the particular Indication, as Signs that promiſe Health or Death, I ſhall briefly mention them; and they chiefly reſpect the temper and government, either of the Blood, with the Vital Spirit,

Spirit, or elſe of the nervous juice, with the animal Spirit. If it be plainly indicated from the Pulſe, Urine, from Actions leſs hurt, and the appearance of other ſymptoms, that the Blood, as to its feaveriſh diſpoſition, is not very much perverted, from its natural temper; that in the fits it moderately burns forth; and in every Combat eaſily ſubdues the load of the feaveriſh matter, and wholly ſhakes it off from its company; that after ſome fits, the maſs of Blood is ſomewhat reſtored towards its due temper; that it perverts little the alible juice, and ſifts forth, with a more gentle riſing up, what is extraneous, and not mingleable, and that if in the mean time, the other ſpirituous Liquor, rightly inſpires and waters the Brain, and nervous Bodies, that ſleep, waking, ſenſation, and motion, are performed well, or at leaſt indifferently, all good is to be hoped concerning the ſick. But if it appears from the ſame Fountains of Indications, that the Blood hath acquired in this Feaver, a diſpoſition far removed from the natural, if it perverts much of the alible juice, and then from its extraneous and incongruous mixture, the Liquor of the Blood is greatly diſturbed, and the Spirits driven into confuſion; if in the fits, the Blood too ſtrongly, and in a long time burns forth, yet doth not truly ſubdue the feaveriſh matter, or exclude the whole, but that by its impure mixture, it is ſtill more and (in every feaveriſh fit) more infected, and the Spirits being continually conſumed, it becomes poorer, we may pronounce the life of the patient to be in much danger. Beſides theſe, if the vices of the nervous juice happen, that being altered from its due temper, or being too dull, and as it were liveleſs, little actuates the Brain and nervous ſtock; or being above meaſure ſharp, continually provokes the ſame into Convulſions and Diſtractions; and if beſides the vaporous effluvias continually falling away from the Blood, or the aduſt recrements being wont to be ſifted forth by a critical ſweat, ſhould be transferred into the head, and there induce Lethargic or Phrenſical Diſtempers, the hopes of health will be little, and we may fear a very deadly event.

Concerning the Cure of this Diſeaſe, the intentions will come under three conſiderations chiefly. Firſt, a quick reduction (as much as may be) of the Blood, and nervous Liquor, to their natural tempers; or at leaſt a prevention of their too great depravation. Secondly, Concerning the right handling the fits of the ſick it ought to be procured, Firſt, that leſs of the degenerate juice, may be gathered together, for matter of the fit; Secondly, that what is gathered together may be wholly diſperſed by every fit, that thereby the ſick may be better in the intervals; Thirdly, that the Body being altered for the better the fits may be inhibited by anti-feaveriſh Remedies. The third intention reſpects the ſymptoms chiefly urging, which ſhould be timely oppoſed, whereby Nature, being not hindred, may reduce whatſoever intemperance may be contein-ed in the Viſcera or Veſſels, may ſubdue and ſift forth the extraneous matter, and at length may recover a lively force and priſtine vigor.

Firſt, therefore, for the reduction and emendation of the Blood aud nervous juice, diverſe manners of evacuations are wont to be exhibited in this Diſeaſe, about the beginning of the Sickneſs, with good ſucceſs. It appears plainly from Modern practice, that vomitories are of more noted uſe in this Diſtemper, than in a common Tertian: wherefore in a robuſt Body, and prone to Vomit, about the beginning of the ſecond or third fit, it is convenient to give an Emetic Medicine. The operation of this ſeems to be very helpful in this Feaver, foraſmuch as it more plentifully evacuates the filth from the ventricle, and the yellow bile from the choler-bearing Veſſels; and becauſe it copiouſly preſſes forth the ſerous juice from the emunctories of the nervous ſtock, planted about the Pancreas and Inteſtines, and by provoking them draws it out. Wherefore we obſerve, that from a Vomit being taken, the ſick do find themſelves better about the Diſtempers of the Head. A Purge (to whom a Vomit is not convenient) may be ordered inſtead of it, the day following the fit, alſo tho an Emetic have been taken, it may be well permitted after a fit or two: But yet only with gentle and benign Phyſic, let it be performed, which will not diſturb or too much move the Blood. We were wont in theſe Feavers, letting alone Diagridium or any Aloetic Medicine, only to give an infuſion or Powder of Senna, Rhabarb, and yellow Sanders, with Tartar and Salt of Wormwood; and to celebrate

celebrate this kind of Purgation not very long after the beginning of the Diſeaſe: But at other times to keep the Belly ſoluble, with the frequent uſe of Clyſters. Frequent experience has ſufficiently taught, that Letting of Blood is highly profitable in this Diſeaſe: for when by reaſon of the Pores in every one, being more ſtrictly cloſed than uſual, the Blood growing hot, by the Feaver, wanted Ventilation, the Letting of Blood ſupplies the place of a more free breathing forth, and prevents the reſtrained *effluvia*, from ſo readily ſuffuſing themſelves on the Brain and nervous ſtock. But this Remedy is chiefly indicated from the very fervent Blood. and more hot temperament, nor ought to be indifferently uſed to old men, Phlegmatic, and other very weak perſons, unleſs perhaps in a ſmall quantity, that the maſs of Blood may be ſomewhat eventilated, and that the removal of the feaveriſh matter into the Brain, may be hindred. If it be convenient to open a Vein, let it be done about the beginning of the Feaver, or at leaſt before the fourth or fifth fit, *viz.* before the Blood is made very lifeleſs by the frequent deflagration, and rendred too impure by the confuſion of the aduſt matter: becauſe, if Phlebotomy be made uſe of, whilſt the Blood is highly corrupted, the Vital Spirits, and by that means the ſtrength of the ſick are more debilitated, nor yet is there any thing taken away, from the power of the Diſeaſe, or from its cauſe. There remains another famous way of evacuation, in this Feaver, to wit, Veſicatory Plaiſters applied to various parts of the Body; theſe are commonly obſerved to be ſo helpful, that thoſe that abhor and diſlike very much ſuch a Remedy, by the example of others being the better for them, have admitted them. By what means they ſeparate the Cuticula from the skin, and liſt it up like a Bladder filled with Water; or whether they preſs forth this watery and limpid humor, out of the Arteries, or out of the nerves, is not in this place to be inquired into; yet that they are profitably adminiſtred in this Diſeaſe, beſides experience, Reaſon ſeems ſomething to perſuade; becauſe it in ſome manner compenſates the want of tranſpiration, by the large profuſion of this kind of ſerous Latex: Moreover, this kind of Remedy, as it were opens the ways and doors, by which both the Blood, and nervous juice, may forthwith ſend forth by a proper purging, the extraneous matter, confuſed with them; wherefore, in the Plague, and Malignant Diſtempers, Veſicatories are eſteemed very profitable. Alſo it appears by common obſervation, that in this, and other Feavers, frequent at the ſame time, they did prevent the more grievous Diſtempers of the Head, and were wont to help them, if they were brought in before: wherefore, epiſpatic Plaiſters, may be applied about the beginning of the Diſeaſe, for preſervation ſake, to Phlegmatic perſons, elderly people, and men of a more cold temper; and they are wont profitably to be adminiſtred to ſeveral others, labouring with a Vertigo, Stupefaction, or cruel Head-ach, for the Cure of the ſame Diſtempers. But in conſtitutions very hot, where with the defect of the ſerum, the Blood is too much burnt, and if thoſe ſick of the Feaver are obnoxious to wakings, or a Phrenſie, with intolerable heat, bliſterings ſeem then to be of little uſe.

For the mending of the temper of the Blood, and alſo the tenor of the Viſcera, at vacant times, when there is leiſure from purging, attemperating Remedies have place, and digeſtives, which fuſe the Liquor of the Blood, and ſeparate its fæculencies, and as it were by precipitating them, thruſt them towards the emunctuaries: For theſe ſort of intentions, are wont to be given Juleps, and refrigerating Decoctions, ſharpned with ſpirit of Vitriol, of Salt, Tamarinds, or with the juice of Oranges or Lemons; forms of which choice enough are commonly to be had. Alſo for this end acetous, ſaline, and ſhelly Powders are uſed, to wit, prepared out of Tartar, Salnitre, the fixed Salt of Herbs, of burnt Harts-horn, alſo the claws and eyes of Crabs. As for example, take of Cream of Tartar drams three, of Salt of Wormwood dram one and an half; the Doſe half a dram, in an opening Decoction, twice in a day out of the fit. Or take of Cream of Tartar dram one, of the Powder of Crabs eyes dram one, of purified Nitre half a dram, mingle them, let them be taken after the ſame manner. Or take of Harts-horn burnt drams two, of the Spirit of Vitriol, what the Powder will drink up, the Doſe is one ſcruple, it is of excellent uſe when thoſe in Feavers are infeſted with Worms. Theſe kind of Remedies, promote the ſecretion of the feaveriſh matter, and alſo reſtore the almoſt deſtroyed ferments of the Blood, and Viſcera.

The ſecond intention, *viz.* concerning the right handling the fits, comprehends more. Firſt, there ought to be inſtituted a right order of Dyet, whereby the more full heaping up of the degenerate juice, for the matter of the fit, may be inhibited; wherefore, they are only to be fed with thin aliments, and they muſt wholly abſtain from fleſh, (or broth made of it) Eggs, ſtrong Drink, and all rich meats and food whatſoever; and be contented only with Barly Broth, or Grewel, Panada, Whey, and ſmall Beer: for that a more plentiful aliment is not digeſted, or aſſimilated, but loads the Ventricle, and being poured into the Blood, diſturbs its Liquor, and compels it to grow impetuouſly hot. In the beginning of the fit, and the time of its duration, no food ſhould be taken, unleſs for the allaying of thirſt: But for the tempering of heat and thirſt, Juleps, and cooling Decoctions, and eſpecially ſmall Beer, and poſſet Drink ſhould be granted. Secondly, a little before the coming of the fit is expected, a gentle Medicine may be adminiſtred, which may drive away the fit by preventing it, or make it more eaſie by procuring a ſweat: for this uſe, the febriſuge potion of the moſt learned *Riverius* ſerves well, of the Water of Carduus, with oyl of Sulphur, and ſalt of Wormwood: Or take of Cream of Tartar, of ſalt of Wormwood, and the ſeeds of Nettles, each one ſcruple, let it be given in the Decoction of the Roots of Sorrel; when the Feaver begins to decline, and that the fits are a little more remiſs, proper febriſuges, applied outwardly, often inhibit the comings of the fits. Yet in the mean time, ſo long as the fits of the Feaver return, the ſick are to be handled ſo, that in every fit, the feaveriſh matter heaped in the Blood, may be throughly diſperſed; wherefore, when ſweat hardly ſucceeds, it ſhould be a little excited by temperate Medicines. Alſo the ſick ſhould be kept in bed, with a gentle breathing many hours, nor quickly permitted to riſe; for I have often obſerved, that ſick perſons have been ſtill worſe, becauſe impatient of their bed, they have put on their cloaths before the vaporous effluvia were ſufficiently exhaled.

Thirdly, as to the ſymptoms, and particular accidents, wherewith the ſick are wont to be infeſted in this Feaver, it is ſufficiently provided for moſt of them, with Remedies, in the method of Cure hitherto deſcribed: again thirſt, the heat of the mouth, the ſcurfineſs of the tongue, vomiting, the looſneſs, fainting, ſwooning, may be referred hither, very well the preſcriptions commonly uſed in other Feavers: but what may ſeem to require in this Diſeaſe a peculiar method of healing, are chiefly the Diſtempers of the head and brain, with the nervous ſtock, which not being timely helped, may ſoon put the ſick into great danger of life: As to the indications of theſe kind of evils of the head, they are of a twofold kind; if it appears from a ſtupefaction or torpor, a Sleepineſs, Vertigo, or Head-ach, that the nervous juice is become too dull, and as it were vapid or lifeleſs, and therefore doth not ſufficiently actuate the brain, and nervous bodies; beſides the Remedies already delivered, and eſpecially veſicatories, Medicines full of a volatile ſalt do chiefly help: wherefore, ſpirits of Harts-horn, and of Blood, alſo the ſalts of them, are of excellent uſe: but if the nervous Liquor be too ſharp, or the effluvia ſuffuſed from the eſtuating Blood, drive the Animal Spirits into confuſions or diſtractions, Remedies of the ſame ſort of volatile ſalt are adminiſtred with ſucceſs in a little ſmaller quantity. Beſides, a frequent letting of Blood, and aſſwaging Medicines, againſt its Fervor, help much; as Emulſions, Whey, and ſimple Water, plentifully drunk; Opiats are cautiouſly to be given in this Feaver, for the Phrenſie being often allayed by them, is changed into a Lethargie, or a deep ſtupefaction.

FINIS.

FIVE TREATISES,

VIZ.

1. *Of Urines.*
2. *Of the Accenſion of the Blood.*
3. *Of Muſculary Motion.*
4. *The Anatomy of the Brain.*
5. *The Deſcription and uſe of the Nerves.*

BY

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THE AUTHORS EPISTLE TO Dr BATHURST.

Worthy Sir,

THE *Inſpection of Urines, and from them an inveſtigation of directions concerning the Medicinal practice, began to be eſteemed among the Ancients, even from the firſt beginning of Medicine: for from hence for the making of judgments concerning the Sick, and for the chuſing the moſt fit times for Curing, the great* Hippocrates *hath chiefly taken both his prænotions, and his precepts, ſo that that famous and to this day approved ſtatute of old Medicine, to wit,* τὰ πέπονα φαρμακεύειν, *to compoſe Medicine according to digeſtions, cannot be obſerved without rightly conſulting the Urinal. Alſo this ſeems conſonant to common reaſon, that for as much as we cannot ſearch into the moſt intimate parts of the ſick Body, as it were a Veſſel ſhut up, judgment is ſought from the infuſed liquor, waſhing all its parts, and taking from many ſome little parcels. For neither more certainly do the acidulous or Spaw-waters, ſhew the nature of the hidden Mine, through which they are ſtrained, than Urines give teſtification of the divers manners of dyſcraſies of our Bodies, and their habitudes. Wherefore the Contemplation of this Excrement, (as vile as it is) hath grown to a Science, and hath exerciſed the ingenuities of the moſt excellent Phyſicians, both Ancient and Modern. Concerning this thing there are many Books extant, writ with great diligence; in which are rehearſed the great differences of Urines, varieties of Colours, and diverſities of Conſiſtence, and their Contents exactly deſcribed, and diſtinct precepts are delivered for every excretion of them: Which indeed are eſteemed by ſome of ſo great certitude, that from the inſpection of the water, a ſignification is ſought of any Diſeaſe, or of the part affected; yea of every accident concerning the ſick. But in this the common people are egregiouſly deceived, and ſtill pertinaciouſly will be deceived, whilſt they imagine the knowledg of every Diſeaſe, and the prognoſtication of it cannot be found out, but by inſpecting the Urine; and eſteem a Phyſician of little worth unleſs he undertakes to divine from the Urinal as from a Magical Glaſs. But indeed, as to what belongs to the precepts, and rules, whereon the reaſon of Judgment by Urine doth depend, there are many collected by diligent obſervation, that are extant, and from thence eſtabliſh'd with good reaſon and judgment: yet for as much as the ſignification of Urines is by ſome too largely extended to particular Caſes, very many uncertain things interwoven, and ſome obnoxious to deceit, and others plainly falſe; therefore who ſhall confidently pronounce concerning the buſineſs of the Sick, by the judgment only of the Water, deſerves rather the name of a jugling Quack, than of a Phyſician.*

But this Doctrine concerning Urines, abounds so ordinarily with errors, that the observations which belong to its practice, are either wrongfully made, or not well reduced into method. We may lawfully suspect that the observations are not rightly made, because, perhaps from one or two particular cases, oftentimes a general Rule is established. For Example sake, because some Hydropical people render a thin and watery Urine, therefore it is affirmed, such sort of Urines necessarily denote a Dropsie, when also in some other diseases, such like Urines are made; and sometimes in the Dropsie, the Urine are thick, and full of redness. Also as it is most commonly received, that Urines on which a cream doth swim (as on water that hath Tartar boyled in it) doth denote a Consumption, which is most uncertain, because this sign is more proper and familiar to Hypochondriacks, than to Consumptive people: And how many dye of Consumptions without this? Besides, what is generally asserted, to wit, that in all diseases whatsoever, Nature doth make known the Disease by the Urine, is altogether false; because sometimes sick people make their Urine like healthful people; and sometimes those who are very well in health, by reason of some accident (perhaps from the meats eaten) have suspected Urine, varying from the natural state or condition. As to what belongs to the method, or doctrine delivered by most, concerning Urines, they seem to be altogether Empirical, and nothing rational: for the naked differences of Urines are rehearsed, and are wont to be distinguished according to their colour, consistency, and contents: thence are opposed to the several species of these pathologick significations, collected only from more rare observations; when in the mean time, the causes of the appearances, nor of the preternatural alterations in the Urines, are not assigned, as they ought to be; nor is the signification of the Urines applyed to the Causes of diseases, but only to the Disease or Symptom; and therefore it is most often deceitful, and uncertain; because the same morbifick Cause, and signification of the same Urine, may in like manner mediately respect at once divers Diseases, and Symptoms. As for Example, a thin and watry Urine most often immediately denotes Indigestion, or a defect of Concoction in the Viscera: nevertheless, by reason of that condition of Crudity, the Green-sickness in Virgins, sometimes the Dropsie, or the white watery phlegmacy, sometimes Head-aches, and many other diseases arise. But the task which you have required of me, Worthy Sir, to wit, That the notions which in times past we have discoursed together, and conceived concerning Urines, as it were collected notes, and what have since fallen under my own knowledg, by my proper study and observation, concerning this thing, should be fram'd into a little Treatise, and that I should write a plain, and new method of Urinoscopie. I confess the work greater than can well be performed by our own proper strength: however, I have resolved as much as I am able, to obey you therein. But that a doctrine or method concerning Urines may be instituted, beyond the vulgar and plainly Empirical manner of Philosophising, there shall be these two heads of our Discourse. To wit, First that the Anatomy of Urine may be delivered, of what elements and parts it consists; and also its genesis in our Body; to wit, by what Concoction this kind of Liquor is made, and then by what secretion of some Particles from others. Secondly, That the inspection of urines in the Urinal may be truly unfolded, and what may be the Rules, and the Certitude of Uromancie, or divination of the Urine.

OF

OF URINES.

CHAP. I.

Of the Elements and chief Accidents of Urine.

WHEN the Liquor of the Urine, being either freſh rendred from the body, or putrified by a long digeſtion, is expoſed to a ſpagirick Analyſis, it is wont to be reſolved into theſe parts or principles: In the Diſtilling, firſt, aſcends whatever of a vinous ſpirit is in it, diluted with water; but yet in ſo very ſmall quantity, that it is not eaſily to be perceived by the taſte it ſelf. To this follows a watry liquor, large enough in proportion, with which are mixed ſome more looſe particles of Salt, and Sulphur eſpecially. Thirdly, There is ſtilled forth a very penetrative water; which is commonly called the ſpirit of Urine, but in truth almoſt without any vinous ſpirit, and is chiefly phlegm highly ſharpned with Salt, and therefore it aſcends laſt, as in the diſtillation of Vinegar: but foraſmuch as the ſalt of Urine is volatile, but that of Vinegar only in the Flux; therefore the liquor ſtilled forth, which is greatly impregnated with its particles, is very acid: That which is imbued with the ſaline Particles of the other, is exceeding ſharp and pricking. It is a ſign that this kind of Spirit of Urine (as it is commonly known) ows its ſharpneſs chiefly to the Salt; becauſe, though it be moſt ſubtil it will not take fire, but being put to it extinguiſhes it. After the humidity is wholly exhal'd, another portion of Salt remains with the earth, in the bottom of the cucurbit; to which if a more hot fire be made, that Salt will be ſublimed into the Alembick, and the earthy feces only remain. This kind of Anatomy of Urine plainly ſhows, that the Elements of which its liquor is compoſed, are a great deal of Water and Salt, and a little of Sulphur and Earth, and a very little of Spirit.

The ſaltneſs in Urines is perceived by the taſte and touch; it comes neareſt to a Nitrous ſalt in ſavour: It is drawn indeed from ſaline particles of things eaten, which being more plentifully exalted by the concoction in the Bowels, and the circulation in the Veſſels, for the moſt part go into a volatile Salt. That is truly Salt and Spirit, by reaſon of the long accompanying of either together, are gathered into a moſt ſtrict bond; and therefore it happens, that the Salt it ſelf otherways fixed, is carryed up on high, and rendred able for motion, as it were by the wings of the other. Urines contain in them more or leſs of Salt, according to the diſpoſition of our body, and have it either more volatile or fixed; which are therefore of a divers colour and conſiſtency.

That there is Sulphur contained in Urines, their quickly putrifying, and ſtink, ſufficiently teſtifie: it ariſes from the fat and ſulphureous particles of Meats, in the concoction being moſt minutely broken, and boyl'd with the ſerum and ſalt; ſo as alſo there is leſs plenty of Spirit in it, than is in Blood, Soot, or the Horns of Animals: wherefore in the diſtillation of Urine, there aſcends nothing almoſt of an oylie form or fat. But indeed, whilſt the blood is circulated in the Veſſels, the ſpirituous and ſulphureous little bodies, which fall away from it, do for the moſt part evaporate out of dores; in the mean time, the ſaline recrements, and the watery, chiefly conſtitute the Piſs: nevertheleſs, Urines do always participate a little of ſulphur, but its quantity and proportion, is diverſly altered according to the various degrees of Concoction and Crudity; and thence alſo the colour and conſiſtence receive many mutations in Urines.

That there is but a very little of vinous ſpirit in Urines, the defect of it in the liquor firſt diſtilled forth, alſo the ſoon putrifying of the Stale do teſtifie: but that there is ſome, the inteſtine motion of the particles in the Urine, doth argue, to wit, the departure of the thin from the thick, and the ſpontaneous ſeparation of ſome parts from others, and a collection of them into a ſettlement: beſides, the ſaline particles (for that they are made volatile) are married to ſpirituals, and ſo they are of a more ready motion, and energy; yet according to the divers plenty of ſpirits in Urines, and their power, there ariſe divers manners of hypoſtaſes and ſettlements; alſo the Urines themſelves, ſooner or ſlower putrifie.

The watry part of the Urine far exceeds the reſt in quantity, and is greater than they by almoſt a ſixth part: it is not ſo ſimply drawn forth by diſtillation, but that ſome particles of Salt and Sulphur (for as much as they are volatile) aſcend with it, and impart to the water an ingrateful ſtink: the potulent matter, copiouſly taken with aliments, affords an original to this; which of what kind ſoever it be, before it is changed into Urine, lays aſide its proper qualities, and acquires others; for truly, from the aſſumed liquor, there is nothing ſincere almoſt left in the Piſs, beſides meer humidity.

That there is earth, and muddy feces to be had in Urines, its diſtillation, or evaporation ſufficiently declares: for when the reſt of the parts are exhaled, the earth as it were a *caput mortuum*, will remain in a moderate quantity in the bottom: Foraſmuch as in the nouriſhing juice, there is required ſomething ſolid beſides the active principles of ſalt, ſulphur, and ſpirit, whence the bulk and magnitude of the body grows; the recrements of this, *viz.* the earthy feculencies, are plentifully diſſolved in the ſerum, and contribute to it a thick conſiſtence and contents: but theſe ſhew themſelves after a divers manner, according to the ſtate of Concoction and Crudity.

Theſe are the principles which conſtitute the body of the Urine, alſo into which it is eaſily reſolved, by a Chymical Analyſis: Out of the divers changes, and various contemperation of theſe, the other accidents of Urine ariſe, *viz.* Quantity, Colour, Conſiſtency, and Contents, which are as to the ſenſe the moſt notable concerning it, and the chief objects of the rendred Urine: For when there is nothing almoſt beheld beſides in the Piſs, they conſtitute theſe firſt Phænomena, in which rightly ſolved, conſiſts the whole Hypotheſis of this Science: Wherefore we ſhall ſpeak in the next place concerning theſe, and firſt of the Urine of healthful people, what its quantity may be, how coloured, with what conſiſtence and contents indued; and together ſhall be unfolded, out of what mixture of Elements, and by what Concoction in the *Viſcera*, and Veſſels, each of theſe depend. Secondly, ſhall be ſhown how many ways the Urines of Sick people vary from the ſquare or Rule of this of the Sound: and I ſhall endeavour to aſſign, for the ſeveral differences of them, proper Cauſes of their alterations; and theſe ſhall conclude our firſt propoſition in this Diſcourſe, *viz.* the Anatomy of Urine.

CHAP. II.

Of the Quantity and Colour of the Urines of Sound People.

THE Quantity of the Urine in ſound people ought to be a little leſs than the humor, or liquid ſubſtance daily taken; for moiſt and drinkable things dayly taken, are the matter it ſelf of which Urines are firſt made: But theſe (hunger and thirſt urging) are more plentifully required, both that they may ſufficiently waſh the maſs of the Chyme, by which means it may rightly ferment in the Viſcera; and that they may ſerve for a Vehicle, both to the Chyme, whereby it may be conveyed to the bloody Maſs, and to the Blood it ſelf, that it might be circulated in the Veſſels without thickening; and to the Nervous Juice, whereby it might actuate and water the Organs of ſenſe and motion: when the ſerous Latex by this means hath beſtowed whatever it hath almoſt of Spirit and Sulphur, for nouriſhment, Heat, and Motion, it gives way to a new nutritious humour; and it ſelf as unprofitable, being ſecluded from the Blood, by the help of the Reins is ſent away:

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The nouriſhing liquor, which will at laſt be changed into Urine, of its own nature is divers, *viz.* now watry, now impregnated with Spirit, now with Salt and Sulphur, and according to the various forces of this or that Element in it Urines are wont to be ſomewhat altered: However all liquors taken in at the mouth, do not paſs thorow our body whole and untouched; but that they undergo mutations in various parts, and loſe a little portion of their quantity, before they are made into Urine: For the Latex or Humour to be converted into Urine, is firſt of all received into the Ventricle, (for I aſſent not to *Renſner*, who affirms the ſame falling for the moſt part on the Lungs, to cauſe the more quick making water after drinking) whilſt that it ſtays in the Ventricle, it is there boyled; alſo impregnated with Salt and Sulphur of its own, or from more ſolid Aliments diſſolved: then very much of it is confuſed in the blood, with the nouriſhable juice; which, when it is a long time Circulated, from thence receives a farther tincture of Salt and Sulphur, according to the various temper of the Blood, and its inkindling in the Heart: Hence ſome portion of it is derived with the Animal Spirit, to the Brain and nervous ſtock; and afterwards from thence, being made lifeleſs and weak, is laſtly reduced into the boſom of the Blood; after that it hath beſtowed on the Blood and Nervous Juice, whatever of generous or noble is conteined in the Serum, alſo no ſmall quantity is conſumed by ſweat and the other emunctories; what remains, whilſt that the Blood continually waſhes the Reins, a precipitation being made, either by a ſtraining or force of a certain ferment, it is there ſeparated from the Blood, and from thence paſſes thorow the Ureters into the Bladder, and ſo is carryed forth of doors.

From the origine and luſtration of the Serous Latex, but now deſcribed, it plainly appears, that the Urine ought to anſwer to the quantity of the liquids taken, in ſomewhat a leſſer proportion, perhaps under a third part; which plainly ſhews the diſpoſition and ſtrength of the Viſcera ſerving for Concoction, as alſo the temper and diſtribution of the Blood it ſelf, and after a ſort of the nervous juice; moreover it carries with it ſigns of the affections of the Urinary paſſages. The quantity of the Urine declines often from this Rule, ſo that ſometimes it ſuperabounds, alſo ſometimes is deficient: and either for a ſhort time, may conſiſt with a diſpoſition not much unhealthful; but if theſe kind of diſtempers continue long, they argue a ſickly condition. Concerning theſe we ſhall ſpeak among the appearances of the Urine in a diſeaſed condition of the Body; we ſhall now next conſider the colour of a ſound Urine.

The Urine of Sound People, which is rendred after Concoction is finiſhed in the Body, is of a Citron colour, like Lye a little boyled: which without doubt proceeds from the Salt and Sulphur of the nutritious juice, and the Blood, diſſolved in the Concoction, and boyled in the Serum. This colour doth not ariſe only from Salt (as ſome would have it) becauſe the Liquor impregnated with Salt, unleſs it be evaporated to a certain thickneſs, will not grow yellowiſh: Alſo Salt of Tartar, being diſſolved by melting, continues ſtill clear. What may be objected concerning the Lye of Aſhes, I ſay, there the whole Sulphur is not conſumed by burning, but the Citron colour ariſes from ſome ſaline Particles, and others Sulphureous burnt, and ſticking together in the Aſhes, and then infuſed or boyled in the liquor. Neither doth the Urine of ſound people acquire this ſame colour from Sulphur only, becauſe Sulphur in a watry Menſtruum, is not diſſolved unleſs by the addition of Salt, nor will it give any tincture of it ſelf; but if Salt of Tartar and common Sulphur be digeſted together in water, or if Antimony be boyled in a ſaline Menſtruum, both liquors will by that means grow yellow like Urine; after the like manner, the ſaline and ſulphureous Particles of Aliments, being incocted and moſt minutely broken in the Serum, by a Digeſtion in the Ventricle and Inteſtines, and by a Circulation with the Blood in the Arteries and Veins, impart to it a Citron Colour.

This kind of diſſolution of Salt and Sulphur, by whoſe means the Urines are made of a Citron Colour, is firſt begun in the Bowels; and afterwards perfected in the Veſſels, and very much depends upon the Concoction performed in the Ventricle and the Inteſtines: For here, by the help of heat and of ferments, the Aliments taken are chiefly ſubdued; the bond of mixture being broken, the ſaline and ſulphureous Particles being moſt ſmally broken, and made ſmall, go into a milkie Cream, and from thence the Serum remaining after that Concoction and diſtribution of that milkie juice, becomes of a Citron colour: after the ſame manner, as when the Salt of Tartar and common Sulphur being diſſolved together, and mixed with ſome acid

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thing, indue a milkie colour; then the contents being ſeparated by ſetling, the remaining liquor grows yellow like Lye. If that the aliments, by reaſon of an evil diſpoſition of the Ventricle, are not rightly digeſted in the firſt Concoction, as in the Longing Diſeaſe or Pica, the Dropſie, and other ill diſpoſitions of the Bowels, uſually comes to paſs, the Urine alſo is rendred crude, clear, and almoſt inſipid, like Fountain water; but if by reaſon of the ferments of the Viſcera being more than duly exalted, or otherways depraved as in the Scurvy, Hypochondriac diſtemper, or Feavouriſh intemperance, the particles of things eaten are too much diſſolved in the firſt Region, by that means Urines are rendred red, and thick.

The Serum, as hath but now been ſaid, being imbued with a lixivial tincture in the firſt Concoction, and confuſed in the Blood, ſo long as it is circulated with it, it is yet further Concocted, and acquires a more deep colour; for the particles of the Blood being roaſted and ſcorched, although for the moſt part they are laid aſide into the Gall bag, yet being in a manner boyled in the Serous Latex, they heighten its colour; hence the Concoction being ended, the Urine which is firſt made, is more Pale, and that which is laſt, more Red. That which is made after long faſting, is yet more high Coloured. Where the Blood is more cold, as in Cachectical people, the colour of the Urine is made leſs; where the Blood grows raging with a feavouriſh Heat, and is roaſted, the Urine grows highly Red.

Concerning the Urines of ſound people, it is worth obſervation, that which is made after plentiful Drinking, hath no tincture, but is pale like water; of which we ſhall enquire, by what means the Serous Latex ſo ſuddenly ſlides away out of the Ventricle, (contrary to what is vulgarly believed) and paſſing thorow all the Chyliferous paſſages, then the Veins, Arteries, the boſom of the Heart it ſelf, and the turnings and windings of the Veins, and Ureters, is put forth of the Body within ſo ſhort a ſpace: moreover, how it comes that the Urine being ſo precipitately made, contrary to moſt other things, is not only changed into no Colour in its paſſage, but it alſo loſes its own proper: For as the Proverb is, *Our Drink goes thick in, and comes forth thin:* or *We Drink thick Beer, and Piſs clear.*

Concerning this we ſay, that beſides the long wandring of the nouriſhing juice, to wit, whereby, after ſome ſtay in the Ventricle, it ſlides into the Inteſtines, and from thence thorow the milkie Veſſels into new paſſages, and thence is carried into the Veins, (which carrying about cannot be quickly performed) it is moſt likely, that there is another nearer paſſage of the ſame Nutritious Juce, whereby indeed it may be conveyed immediately and without delay to the Maſs of Blood, and perhaps to the nervous Liquor; and therefore, after faſting there immediately follows a moſt quick refection of ſtrength and ſpirits, after Eating, and eſpecially after Drinking; which indeed cannot be thought to be made by the Spirits and Vapours; alſo from ſuch drinking, the Urine is preſently rendred, and indeed ſooner than it can be thought, that the Maſs of the Chyle can be ſent out of the boſom of the Ventricle; wherefore, it is not improbable, that when the Alimentous Liquor is entred the Ventricle, preſently the more thin portion of it, which conſiſts chiefly of Spirit and Water, is imbibed by its Spongeous Membranes; and from thence being inſtilled into the little mouths of the Veins, it is preſently confounded with the Blood, flowing back towards the Heart. For of this opinion (though not very ſtubbornly) I always was, *That the Chyme was in ſome meaſure immediately derived from the Ventricle, and Inteſtines, by the branches of the Vena Porta, into the Maſs of Blood*; and as the milkie paſſages carry it about by a long compaſs, whereby it may be inſtilled into the deſcending Trunk of the *Vena cava*; ſo that it may be carried in a more near way, *viz.* into the aſcending Trunk of the ſame, by theſe Veſſels; foraſmuch as the Blood being made poorer in its Circulation, returning from either part, before it had entred the Heart, it ought to be refreſhed with a new juice, whereby it might more lively ferment in the boſom of the Heart; but foraſmuch as the much greater part of the Blood is carryed upwards, ſurely it may ſeem agreeable to truth, that at leaſt ſome portion of the nouriſhing Juice may be added to this, as it were a ſuſtenance, it being before burnt forth, and almoſt lifeleſs, for its new inkindling in the Heart. The Arguments that ſeem to perſwade to this, not of light moment, I could here heap together, but I ſhould ſo divert far from our propoſition: wherefore, that we ſo ſuddenly make a wateriſh Urine after Drinking, I eſteem to be done after a manner as was but now ſaid; therefore the Liquor that is carryed ſo haſtily from the Aliments to the Maſs of Blood, paſſing thorow the ſo narrow windings (as are the Mem-

Membranes of the Viſcera) being drawn as it were by diſtillation, the more thick matter being rejected, conſiſts almoſt only of Water and Spirit; with which indeed it refreſhes the vital Spirits, and dilutes the Blood; about which task, when the ſpirituous part is conſumed, the watry Latex, becauſe of its plenty, being heavy and troubleſome, is continually ſent away by the Reins; and when it comes from the Ventricle, not yet imbued with Salt and Sulphur, nor is long circulated with the Blood, that it might by that means acquire a lixivial tincture, it is rendred thin, and clear.

CHAP. III.

Of the Conſiſtence and Contents of the Urine of Sound People.

SO much for the Quantity and colour of Urines, which proceed from a ſound Body; but as to what belongs to the Contents, we muſt know, that there ought to be nothing beſides the Hypoſtaſis in a ſound Urine; but what this is, and by what means it ſinks down, remains to be unfolded in the next place.

So long as the Maſs of Blood, being fuſed with the ſerous and nouriſhable humour, is continually Circulated in the Veſſels, from it a certain nutritious juice is made, by a perpetual digeſtion, which being put continually to the ſolid parts, goes into nouriſhment: This firſt of all is digeſted into a glutinous humour, like the white of an Egg, afterwards into thin Filaments or Rags, which being interwoven in the Pores and little ſpaces of the ſolid parts, ſtill afford to them an increaſe of new ſubſtance; but whilſt the Serum being mixed with the Blood, waſhes all the Regions of the Body, it ſucks up into it ſelf a certain ſuperfluous portion of this laſt Aliment, to be lay'd on the ſolid parts, and carries it forth of dores with it ſelf; and this it is that conſtitutes the Hypoſtaſis or ſettlement in Urines; wherefore ſo long as this is preſent, it indicates how far Concoction and Nutrition in ſome meaſure is performed, and is accounted a laudable ſign; its abſence ſhews Crudity and Cachectical people, or a Dyſcraſie in Feavours; it conſiſting of ſmall Threads or Filaments, is diſperſed at firſt thorow the whole body of the Urine, and then is collected into a little Cloud, by this means. Theſe Filaments or Threads, are long, and ſmooth, alſo indued with ſome ſharpneſſes like Brier-pricks, that from thence being ſhaken about, they eaſily lay hold of one another, and are faſtned together; even as if into an Urinal full of water, you ſhould caſt many Hairs, and then by ſhaking about the Veſſel, the hairs at firſt ſwimming diſperſedly, in a little time would lay hold on one another, and be collected into a little bundle; after the ſame manner (as it ſeems) the little threads which conſtitute the Hypoſtaſis or ſettlement being variouſly here and there agitated by the colour and ſpirits implanted in the Urine, intangle and thruſt upon one another, untill they gather into one little Cloud by the mutual knitting of all together; and becauſe theſe Filaments are compacted, and more ſolid than the other Contents of the Urine, they ſink towards the bottom with their weight.

It is very likely, that theſe kind of Filaments, make the Hypoſtaſis in the Urines of Sound people, for that the Blood being well conſtituted, and diſpoſed to nouriſhment, is very much ſtuffed with Fibres, or white Filaments: becauſe, when a Vein is opened, if the Blood let out be received into warm water, it will be conſpicuous to any one; for the red thick ſubſtance being diluted with the liquor, theſe ſmooth and white threads ſwim in the water; wherefore it ſeems, that ſome of theſe thin or ſlender rags, being ſnatch'd away with the ſerous juce, are the matter of this cloud ſubſiding in the Urine; wherefore in Cachectical people, by reaſon of Crudity, the Blood being very wateriſh, and unfit for nouriſhment, is deſtitute of theſe well labour'd Fibrils; alſo in Dyſcraſies, when the nutritious humour, the Blood being too much ſcorched, is not rightly concocted into theſe kind of Filaments, the Hypoſtaſis in Urines is either wholly wanting, or is very confuſed and diſturbed.

It is ſaid to be a good and laudable Hypoſtaſis, which is of a whitiſh colour, of a round and equal figure, and ſinks towards the bottom, to which are required, Firſt, that that laſt Aliment be rightly labour'd, whereby the Filaments may become white, ſmooth, and ſolid, like to ſlender Fibres. Secondly, that the Urine be ſufficiently ſtrong in ſpirits, which (as is beheld in the growing hot of Muſt, or new Wine) may

may agitate, and compel here and there all parts. Thirdly, that the liquor be not too thick, nor that its Pores be firſt poſſeſſed by ſtrange bodies, whereby the motion of the contents may be hindred, but that a ſufficient ſpace may be left, for the free agitating and toſſing about theſe kind of Particles.

If the ſubſtance be red, it is a ſign that that laſt Aliment is ſcorched and burnt, with too much heat; wherefore ſuch a ſediment, for the moſt part is in the beginning of a Feavour, ſo long as the Coction in the Viſcera and Veſſels, is not wholly perverted; if the Hypoſtaſis be broken and unequal, it is a ſign that the nutriment deſtinated for the ſolid parts, is not rightly and equally concocted, and that its Particles are not homogene, and alike in every part: wherefore the Filaments do not cohere together, but theſe with thoſe, and they with others, are entangled apart; hence ſome more thick deſcend towards the bottom, and others more light ſwim upon the top. When the Hypoſtaſis does not wholly ſink down, but hangs all of it, either in the middle or upper Region, that happens, becauſe that thoſe Filaments are not perfectly laboured, nor ſolid and compact, but more rare and ſpungy, or becauſe the liquor is thicker, and more impregnate with Salt and Sulphur, and therefore like Lie it ſuſtains ſome weights, which otherwiſe would ſink to the bottom. Sometimes the Hypoſtaſis is wholly wanting, in ſound people, after long faſting, immoderate labours, or copious ſweating, the matter being wholly conſumed into nutriment, or evaporated by ſweat; in Feavours, by reaſon of the very depraved condition of the Blood; alſo in the Pica, Cachexie, and other Diſtempers of that kind, by reaſon of the great Crudity.

Concerning the conſiſtency of the Urine in ſound people, there is not much worthy conſideration to be met with: It is wont to be of that ſort, as midling Beer is, being purified by a long Fermentation; or Lye a little boyled, *viz.* the watry liquor of the Urine, ought to include in its Pores and paſſages, a great many Particles of Salt, and Sulphur, moſt ſmally broken, and diſſolved; and beſides a little of earth, divided very exceeding ſmall, and diſperſed thorow the whole body of the Piſs; if the conſiſtence be thinner than it ought, as it is in clear, or limpid Urines, and watry, it is a ſign of indigeſtion and crudity; that the Aliments are not fully overcome, and Concocted; but if the Urine be thicker, and cloſer than it ought, it is a ſign, that the body of the liquor, is filled with preternatural Contents. But of theſe elſewhere, when we ſhall ſpeak of the Urines of the Sick.

Thus far of Urine, foraſmuch as it is an Excrement, and ſign of Concoction in a ſound body (truly performed in the Viſcera and in the Veſſels) the quantity or bulk of which is to be determined by the potulent matter; the colour Citron, from the diſſolved Salt and Sulphur, and boyled in the Serum; the Hypoſtaſis or Contents depend upon the Filaments, elaboured in the Blood, for the nouriſhment of the ſolid parts; the conſiſtency on the Salt and Sulphur, together with the Particles of Earth, filling the Pores and paſſages of the ſerous liquor. It next remains, that we treat of the Urines of ſick people: in which alſo, the Quantity, Colour, Contents, Conſiſtence, and ſome accidents beſides, offer themſelves to conſideration.

CHAP. IV.

Of the Quantity and Colour in Urines of ſick People.

IN a Morbous proviſion of Bodies, or Sickly eſtate, the quantity of the Urine does not exactly quadrate with the proportion of the liquid things taken; for ſometimes it wants of its due meaſure, and ſometimes exceeds it. When the Urine is much leſs than the drinkable things taken, the reaſon is, becauſe the watry Latex either ſtays ſomewhere in the Body, or is diverted by ſome other way of Excretion, than by Urine: if it remains within; Firſt, it is either heaped up about the Viſcera, and their Cavities, and ſo is ſtay'd now in the Ventricle, more than it ought to do, and induces by the diſtention of it, troubles, with ſpitting; but more often, it is laid up in the hollowneſs of the Abdomen, and ſometimes of the Thorax and head, and there is wont to cauſe Hydropic Diſeaſes. Or, Secondly, the Serum ſtagnates in the Veſſels, and ſo increaſes the bulk of the Blood, and Nervous Liquor, and

and notably perverts its motion; whence Catarrhs, Rheumatick diſtempers, and often Palſies and Convulſions are cauſed. Or thirdly, this watry humour is fixed in the habit of the body, and ſo creates a ſwelling up of the whole body, or of ſome parts. Or fourthly and laſtly, it is obſtructed in the urinary paſſages, by the Stone, or thick matter, as it were a dam oppoſing it; and cauſes in thoſe parts pains and Convulſions, and a fulneſs of the Serum in the whole body. When the ſerous water is other ways beſtowed, the Patients are for the moſt part prone to frequent and troubleſom Sweats, or almoſt to a continual Looſneſs.

The diſtempers therefore which the ſmall quantity of the Urine is wont to indicate, are ſometimes the ſwelling up of ſome of the Viſcera, and a heaping up of water in them, ſometimes Catarrhal diſtempers, ſometimes evil diſpoſitions of the nervous ſtock: ſometimes an Anaſarca and watry Tumors; and ſometimes the ſtony diſpoſition of the Reins and Bladder. And ſometimes alſo the diminution of the *Urine* is the effect and ſign of ſome other preternatural evacution, *viz.* an immoderate excretion of Sweat, Lask, or ſome other thing. To deſcribe here exactly all the ſubſiſtences of the ſerous Latex, either in the body, or the cauſes of it other ways excreted, and the manner of doing it, were to transfer hither almoſt the whole matter of Pathology; for many and divers are the occaſions and circumſtances, whereupon this Serum is heaped up in this or that part, and ſubſiſting in the body, diminiſhes the quantity of the Urine; but for the moſt part the principal and moſt frequent cauſe of this conſiſts not ſo much in the fault of the Liver, Spleen, or Reins, as of the blood it ſelf: to wit, a copious and free making of Urine, as alſo its ſtay in the body, and only made in little quantity, depend chiefly on the temper of the blood, and either on its kindling, or fermentation in the heart: for if the blood be ſtrong in rightly exalted principles, (*viz.* Spirit, Sulphur, and Salt) it grows very hot in the Veſſels, and ſo the frame of the liquor being looſe enough, it is duly kindled by the ferment of the heart; and almoſt ſpiritualizes the whole, paſſes through all parts with heat and a rapid motion, without ſtopping, and whatſoever is ſuperfluous and volatile, evaporates out of doors: and whilſt the blood is rarified, and boiling with heat, paſſes through the Reins, what is ſerous is eaſily ſeparated, either by the ſtrainer of the Reins only, or (which is moſt likely) by a coagulation, and is as it were precipitated from the remaining maſs of the blood. The ſame thing almoſt happens after this manner to the blood, as we may obſerve in Milk, *viz.* whilſt it is warmed, and grows hot, it moſt eaſily goes into parts, and its Serum is moſt eaſily ſeparated by the leaſt drop of Runnet, or Coagulum put into it: but if you pour much more ſtrong and ſour ferment into it, when it is cold, a precipitation will hardly follow; ſo if the blood becomes through an evil conſtitution, or ill manner of living, more cool and watry, that being leſs endued with active Elements, it grows but dully hot, and is but little kindled in the heart; it is circulated very ſlowly and difficultly in the Veſſels; paſſing through the Pores and paſſages of the Viſcera, it cleaves a little to them, and leaves ſomething behind it; whence are begotten every where Obſtructions and Tumors; alſo the blood by this means becoming viſcous and cool, and ſo unfit for precipitation or percolation, lays aſide leſs readily its excrements in the Reins; but leaves them every where in the body, becauſe it hardly, and not without the reſidence of a certain humor, is circulated. Wherefore in this ſtate, thoſe things that move the blood very much, as exerciſe and a more quick motion; or alſo ſuch as may fuſe it, as it were with a Coagulum or Runnet, as are ſharp things, and preparations of Salts, will more freely provoke Urine.

It ſometimes happens, that the Urines of the ſick are made in a large quantity, and very profuſe, that in a day and a nights ſpace, they make perhaps twice or thrice as much water, as the Liquids they have taken; the cauſes of which diſtemper are alſo various, and the ſignifications very divers; if after the ſuppreſſion of Urine, or its quantity formerly leſſened, if in Hydropick diſtempers, Rheumatiſms, or paſſions of the nervous ſtock, or in the Criſes of Feavers, a flowing down of the Urine follows, either of its own accord, or by the uſe of Diureticks, it denotes a Cure of the diſeaſe, or preternatural diſpoſition, or at leaſt a declining of it. But if (as I have often obſerved) in a lean and weak conſtitution (without any of the previous diſtempers but now recited) the Urine exceeds much the Liquids taken, and from thence a great debility of the whole follows; this indeed ſignifies an evil diſpoſition, with a tendency to a waſting or Conſumption. I have known ſome women of a tender and moſt fine make, who ſometimes being ill, for many days,

were wont daily to make water in a great abundance, (exceeding twice the Liquids taken) and that watry and thin, without contents or ſettlement; at which time they have complained of a languiſhing of ſtrength, difficult reſpiration, and an impotency to motion. I ſuppoſe in this caſe, that the blood and nervous juyce grow too ſour, from the ſalt carried forth, and ſuffering a Flux, and therefore that they are ſomewhat looſned in their mixture, and fuſed ſo much into ſeroſity, as to be made fit for it. For it is to be obſerved, that all Liquids, though more thick and mucilaginous, if they be kept to a ſourneſs, preſently become for the moſt part watry and limpid: alſo the flowing down of the Urine is ſometimes ſeen to ariſe from ſuch a diſpoſition of the blood and humors: for that the Urine ſo copiouſly excreted, is like Vinegar in taſte; and theſe kind of diſtempers are uſually cured, chiefly by Chalybeates, and not by binding and thickning things.

But as to what reſpects the Colour, the Urine of ſound people may be the ſquare or rule, to which all the reſt of the ſick may be referred; for as the colour of ſound peoples is Citron, the Urine of the ſick is paler than Citron, and ſo either watry, or white, or higher coloured than it; whoſe chief kinds are, flame-colour, yellow, red, green, and black. I ſhall run through every one of theſe briefly, and endeavour to weigh them together, by what cauſes all the alterations may be made, and what diſtempers, or proviſions of diſeaſes they are wont to make known.

The Urine is watry or limpid, when by reaſon of the indigeſtion of the Ventricle, the ſaline and ſulphureous particles of things eaten, are not rightly ſubjugated, nor being ſmally broken, are made ſo volatile, that being diſſolved in the Serum, they may impart to it a tincture, which it may carry with it, through the ſeveral turnings and windings of its paſſage: For the Latex or juyce to be changed into Urine, becauſe it is forced through very ſecret paſſages, and narrow, as it were by a certain diſtillation; therefore it is wholly deprived of the colour and conſiſtency, which it had from the taken Liquids, and imbibes almoſt nothing, but the volatile part, from the Chyme, whoſe Vehicle it is. Wherefore, if by reaſon of the great crudity, the Salt, Sulphur, and other contents are not firſt made volatile in the Viſcera, nor afterwards diſſolved in the Veſſels, that they may make their paſſage together with the ſerous juyce; it being at laſt ſtripped almoſt of all, is ſent out like clear water. That ſuch Urines do want the active principles, it is a ſign, becauſe they are kept a long time from putrefaction: This ſort of Urine denotes in Virgins, for the moſt part, the Green-ſickneſs, in moſt the Cachexy or Dropſie; in all it is a note of indigeſtion and crudity. Sometimes in thoſe obnoxious to the Stone, it foretels the approach of the fit, *viz.* whilſt the Serum is coagulated by the ſtony juyce in the Reins, its diſſolutions and contents are congealed into a tartareous matter, only a watry juyce or Latex ſtaying behind. Thoſe who for ſome time make a thin and watry Urine, whatever ſickneſs they are obnoxious to, have often adjoyned to it a difficulty of breathing, and ſhortneſs thereof after motion, and a diſtention about the region of the Ventricle, and as it were a ſwelling up after eating. The reaſon of the former wholly depends on the defect of ſpirits in the blood, becauſe its liquor is not fully imbued with active principles (of Spirit, Sulphur, and Salt) rightly exalted; therefore it is not ſufficiently kindled by the ferment of the heart, whereby the whole may preſently leap forth, and break as it were into a flame: but that hardly fermenting, and being apt to ſtagnate in the heart, and for the moſt part to reſide there, burdens it grievouſly: wherefore if the blood ſo diſpoſed, is urged more than it is wont, by a more quick motion, into the boſom of the Heart, becauſe not being rarified of its own accord, it may preſently go wholly forth, therefore there is need of great endeavour of the Lungs, and a more quick or frequent agitation, whereby it may be carried forth. Therefore watry Urines ſignifie this kind of Crudity in the blood; becauſe, for as much as they receive no tincture almoſt from the Salt and Sulphur, it is a ſign that the Particles are little diſſolved in the maſs of blood, or are rendred volatile. As to what appertains to the inflation of the Ventricle (of which alſo limpid or clear Urines are the effect and ſign) I ſay, becauſe of a defect of due Fermentation, the Chyle goes not into a volatile Cream, but (like bread not fermented) into a ſad and heavy maſs; which indeed is ſlowly, and not without a reſidence of viſcous Phlegm, carried out of the ſtomach: its reliques being impacted in the folds and Membranes of the Ventricle, obſtruct all the Pores and paſſages, that nothing may vapour forth, nor that the thin and ſpirituous part may be conveyed (as it ought to be) by the ſecret paſſages, to the blood: hence flatulencies are begotten,

gotten, which continually diſtend the Ventricle, and blow it up beyond its due bulk: alſo when thoſe Feculencies are left a long time in the ſtomach, they abound in a fixed Salt, and degenerate now into an acid, now into a vitriolick matter, or of ſome other nature; from whence Heart-aches, deſire of abſurd things, oftentimes Heat with cruel thirſt, and ſometimes Vomiting ariſe: ſome of which though they argue a very ſharp heat to lye hid within, yet by reaſon of the want of concoction, ſuch diſtempers often render the Urine crude and watry. We have treated thus largely of a limpid or clear Urine, becauſe from hence the reaſons of the reſt (which as to colour and conſiſtency are pale and thin in healthful perſons) may be drawn. For from the Salt and Sulphur, more or leſs diſſolved and boiled in the Serum, the appearances of a pale and ſtraw-coloured Urine, and of other colours, under a Citron colour, are excited; and by the like means, which was ſaid of the watry, they may be unfolded.

There remains another certain kind of Urine, more pale than the Citron colour, not thin, but thick and cloudy, and of a whitiſh colour; it appears by common obſervation, that children do often make ſuch water, when they are troubled with the Worms: The reaſon of which ſeems, becauſe the matter whereof the worms are made, is a certain viſcous Phlegm, heaped up in the Viſcera, by reaſon of the indigeſtion of the Chyle, and a defect of making or generating Spirits, which matter at firſt tranſmits no tincture to the Urine, becauſe of its fixity, the ſame afterwards putrifying is exalted, and is in ſome manner volatilized; and then partly by heat and ſpirit, is formed into worms, and partly being confuſed with the paſſing Chyle, and carried into the veſſels, when 'tis made unfit for nouriſhment, it is ſeparated with the Serum from the blood, and being mixed with the Urine, gives it that white colour. Sometimes alſo in Feavers, eſpecially of children, the Urine is whitiſh: the reaſon of which is, becauſe the ſupplement of the nutritious juyce being poured from the Chyle to the maſs of blood, is not rightly aſſimilated, but degenerates into an excrementitious humor: A portion of which being incocted in the Serum, imparts to it the thick conſiſtence and milky colour: otherwiſe than in the Feavers of thoſe of riper years, where when the heat is ſtronger, the ſame degenerate juyce impreſſes on the Serum a red colour. Alſo the Urine is whitiſh in the flowing of the Whites, the Gonorrhœa, Ulcers of the Reins and Bladder, and of the urinary paſſages, by reaſon of the confuſion or mingling of the filthy matter, or the corrupted ſeed: however it be, that the colour of the urine be white, it is produced from its contents, which at laſt putting down its ſettlement to the bottom, the liquor for the moſt part becomes of a paliſh and yellowiſh colour; even as it may be perceived by the making of the Milk of Sulphur, where the milky ſubſtance ſinking down to the bottom, the over ſwimming liquor is of a Citron colour.

Urines whoſe colour is deeper than Citron, owe their appearance, not only to the Salt and Sulphur diſſolved more than uſual, but in ſome ſort to the more thick contents in the liquor. The more plentiful diſſolution of the Salt and the Sulphur, is chiefly performed in the veſſels, in the maſs it ſelf of the blood, and from thence the Tincture is impreſſed on the ſerous Juyce: But this happens to be done for the moſt part, after a double manner, *viz.* either by reaſon of the feaveriſh fervour, for as much as the blood boiling in the veſſels, and being more kindled in the Heart, is very much looſned in its mixture, and ſo copiouſly fixes on the Serum the particles of Salt and Sulphur, waſted as it were by the boiling: Or without a Feaver, when theſe kind of ſulphureous and ſaline little bodies, wont to be ſent forth at other ſinks, are reſtrained; and ſo being by degrees heaped up in the blood, are poured into the Serum. Of this alſo there are two chief cauſes or means; for either the excrements of the blood, which chiefly participate of aduſt Sulphur, and that ought to be ſent away by Choler-carrying veſſels, are retained, and ſo they impreſs, being ſuffuſed on the ſerous humor, a tincture of yellowneſs: or elſe the Effluvia's, which are chiefly of a ſaline nature, and ought to be evaporated by inſenſible tranſpiration, are reſtrained, and from thoſe the urine is filled with a lixivial tincture. The urines of the former kind are proper to people that have the Jaundice; but thoſe of this latter are familiar to the Scurvy: for in the Scurvy the ſaline particles of the blood depart from volatilization, and get a Flux: wherefore, by reaſon of their fixity, they will not evaporate, and ſo being more fully heaped together in the blood, they more and more pervert its Craſis, and very much impregnate the ſerous humor with a ſaltneſs. The contents which heighten the colour

of the urine, are of a twofold kind, to wit, either aduſt recrements, remaining after the deflagration of the blood, or particles of the nutritious juyce, degenerated into an extraneous matter: Concerning which we ſhall ſpeak hereafter in their proper place. It now remains that we deſcribe particularly the ſeveral Colours of Urine more intenſe or deep than Citron colour.

1. The firſt is a flame-coloured urine, which ſhines with a brightneſs like the Spirit of Nitre: and this is very often ſeen in an intermitting Tertian Feaver; this colour ariſes from a portion of the thinner yellow Bile, mixed with the Serum, whilſt it is in motion: for that in this Feaver there is a ſharp and hot intemperature of the blood, which burns and ſcorches all the humors, and ſo plentifully begets Choler. But although this, for the moſt part, is ſeparated from the maſs of blood by the bilary veſſels and paſſages; yet when it abounds in the veſſels, a part of it, or (which is the ſame thing) ſome burnt and aduſt particles of the blood and humors being boiled in the ſerous water, impart to it an high or deep yellowneſs. This urine is thin and ſhining, for that there is in this diſeaſe almoſt a continual breathing forth, that thruſts out the recrements of the nutritious Juyce, and all the thicker parts of the Serum towards the circumference of the body.

2. The Saffron-coloured urine, and which dyes Linen with the ſame colour, undoubtedly is a ſign of the Jaundice: it is tinged after this manner by the yellow Bile or Choler, or by the Salt and Sulphur burnt and plentifully mixt with the Serum: for the yellow Bile is neceſſarily begot from the yoked heat and motion of the blood; but for this the Gall bag is deſigned by Nature, for the ſeparating it from the maſs of the blood, its paſſages being rooted in the Liver: But if ſuch a ſeparation be any ways hindred, that humor flowing back in the blood, and copiouſly heaped together, infects the skin with its yellowneſs, the blood, and eſpecially the ſerous Latex. The Saffron-coloured urine differs from the flame-coloured, becauſe in this only a certain portion of the more thin Bile is poured into the urine, but in that the more thick part, and much more plenty: beſides, in the yellow Bile the Sulphur, with the Salt, being joyned and long circulated, is fully diſſolved by it, that it becomes like paint, imparting to every ſubject a Saffron-coloured tincture; as when common Sulphur and Oyl of Tartar are mixed together. But what things cauſe a redneſs in urines, without the reſtagnation of this Bile, happen after the ſame manner, as in the Lye of Aſhes: where the particles of the Sulphur, without any previous diſpoſition from the ſaline, are forthwith put down with them in the Liquor.

3. It remains that we ſpeak next of red Urines, which are of a divers habit, neither do they always depend on the ſame cauſes, nor plainly denote the ſame kind of diſtempers; we ſhall briefly run through the chief differences and proper ſignifications of them. Firſt, the liquor of the urine is either red of it ſelf, and remains after the ſame manner, nor is the colour altered by the ſetling or ſinking down of any of the parts: or ſecondly, the redneſs of the urine chiefly owes its colour to the Contents, which being ſetled to the bottom, the liquor grows yellow, or is leſs red. The diſtempers that theſe kind of urines are wont to ſhew, are chiefly Feavers, and a confirmed Scurvy, and Conſumption. We ſhall conſider the reaſons of each.

1. When the Urine that is made red ſo remains, it is firſt either of a mean conſiſtency, and ſomewhat clear, and then it owes its colour to the Salt and Sulphur, being burnt more than uſual, and ſo boiled more copiouſly in the Serum: or ſecondly, ſuch an urine is red, and alſo troubled and cloudy: but this, beſides the contents of Salt and Sulphur, has boiled in it ſome earthy particles alſo, which indeed being impacted in the Pores and paſſages of the ſerous Latex, do not deſcend: becauſe the liquor of the urine is deſtitute of convenient ſpirits, which may ſegregate all heterogeneous things, and drive them to the bottom, as is wont to happen uſually in dead drink, or Beer growing ſour by reaſon of Thunder; where the liquor is infected with a troubled Feces, and by reaſon of the defect of ſpirits, will not grow clear; wherefore this kind of urine is a very bad ſign in Feavers, becauſe it ſhews ſuch a confuſion in the blood of aduſt and to be ſeparated matter, ſuch as the vital ſpirits are not able to maſter by taming and ſubjugating it.

2. Sometimes the Urine is made red, by reaſon of its contents; which ſetling in the bottom, the liquor becomes of another colour: but theſe contents, as before we hinted, are twofold, *viz.* now thin, which are the remaining matter, or aduſt recrements after the burning forth of the blood; now more thick, to wit, the degenerate particles of the nutritious Juyce; both theſe being torrified, and ſeparated from the

the burning blood, are partly thruſt forth by Sweat, and partly mixed with the ſerous Latex, thicken its conſiſtence, and heighten its colour, *viz.* ſo long as theſe kind of contents are included in the Pores and paſſages of the liquor, they are ſuſtained, the colour of the urine appears more deep, and the conſiſtency thicker: but theſe being precipitated to the bottom, both the redneſs and thickneſs of the liquor are leſſened. The reaſon of this ſhall be given anon, where we ſhall ſpeak of the Cauſes of the Colours, and alſo of the Clearneſs and Cloudineſs of Urines: we ſhall now inquire, what is the reaſon of the difference, that red urines are wont to be made both in Feavers, and alſo in the Scurvy, Conſumption, and perhaps in ſeveral other diſtempers.

1. In Feavers, the liquor of the Urine is filled with redneſs, becauſe of the more plentiful diſſolution of the Salt and Sulphur, and their particles copiouſly boiled in the Serum; for whilſt the blood and humors grow hot, from the feaveriſh cauſe, by reaſon of the heat being more fully inkindled, the ſaline and ſulphureous little bodies, being burnt and torrified, are more diſſolved; and being boiled in the ſerous Juyce, impart to it a deeper tincture: Even as if the Lye of Aſhes be boiled over the fire, it grows more red, than if it were only made by infuſion. Alſo in Feavers, the contents of the urine moſt often increaſe its colour, *viz.* by reaſon of the intemperance and deflagration of the blood, both the degenerate particles of the nouriſhing Juyce, and alſo other matter (as it were the Aſhes remaining of the burning of the blood) are burnt together, as it were into a reddiſh Calx; which being included in the Pores of the urine, renders its colour deep, and afterwards ſinking down, makes a ſediment like red Oker.

2. In a long Scurvy, the liquor of the Urine grows ſometimes ſo highly red, that it cannot be greater in a burning Feaver: if ſuch urine be evaporated, or expoſed to diſtillation, it will ſhew great plenty of Salt, with a muddy Feces or dregs: wherefore it ſeems to be manifeſt, that this deep redneſs doth chiefly ariſe from the Salt, (as we have already hinted) by this Experiment; becauſe in Scorbutick people the ſaline particles, which ought to be made volatile, and ſo conſtantly exhaled by tranſpiration, become fixed, and being hindred from a flux, are heaped together more plentifully in the diſtempered body. The Salt remaining within, is variouſly coagulated with Sulphur and Earth, and then is continually diſſolved: and from this diverſe coagulation and diſſolution, the to be admired Symptoms of this Diſeaſe are cauſed. Alſo from the ſaline little bodies plentifully diſſolved with Tartarous feculencies, and diluted with the Serum, urines are filled with an high redneſs; to which moſt often happen in this inveterate diſeaſe vices of the Liver and Gall; for when theſe Inwards, being either obſtructed or other ways depraved, cannot perform their tasks, for the ſeparating the aduſt particles of the blood, they being more fully heaped up in the blood, are diſſolved in the ſerous Juyce, and infect it yet with a more lixivial tincture. And if the aduſt particles of the Sulphur do excel the reſt of the fixed and ſcorbutick Salt, the yellow Jaundice happens together with the Scurvy, and the urine fixes to Linen a Saffrony tincture. But if they be leſs than they, and that the ſaline particles excel, the Scorbutick diſtemper only is produced, in which the urine is intenſly red, yet does not dye the Linen. I am perſwaded that it is thus; becauſe, when I have opened the dead carcaſſes of many dead of the Scurvy, in whom there was a red urine, I obſerved that the Liver or Gall was in fault: In ſome the Liver was wholly without blood, and dry like a Cows Udder; in others the bag of the Gall was empty, and nothing in it; in others it was beſet with little ſtones; in others it was filled with filth, not bitter; in all theſe Inwards were ſo diſtempered, that the ſecretion of the Bile was hindred.

3. By reaſon of this kind of diſſolution of the Salt, Urines ſometimes grow red in Arthritick diſeaſes: for beſides the Gout (in which ſuch urine is often made) I have obſerved in ſome a painful diſtemper, and as it were like a Feaver, cauſed, with a very high-coloured urine; they had wandring pains, now in this place, now in that, grievouſly tormenting, that the ſick were ſcarce able to ſtand, or to ſtir their limbs: they were obnoxious to wakings and frequent ſweats; they were alſo troubled much with thirſt, and heat of their mouth: and they had a urine highly red, with a plentiful red ſediment. In the mean time it did not appear, either by the Pulſe, languiſhing of the Spirits, or Head-aches, that the blood grew exceſſively hot, or that they had a Feaver. Wherefore I ſuppoſe that this kind of diſtemper doth chiefly conſiſt in the nervous ſtock, and depends on the exorbitances of the ſaline Principle, rather than the ſulphureous.

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4. Alſo in the confirmed Phthiſis or Conſumption, eſpecially if an Hectick Feaver be joyned with it, there is a red Urine; the reaſon of which is, if at any time an Ulcer is excited in the Lungs, the putrid filth from thence being mingled with the blood ſliding by, cauſes in it almoſt a continual effervescency, whereby the ſulphureous and ſaline particles being more plentifully diſſolved and boiled in the Serum, affect its liquor with redneſs: beſides, by reaſon of the blood being defiled after this manner, the nouriſhing Juyce degenerates almoſt wholly into putrefaction, by whoſe recrements the urine being filled, grows more red, and is very much ſtuffed with contents: The ſign or note of this is, that the ſick for the moſt part grow hot after eating, and that they are troubled with an heat through their whole body, followed with a nightly ſweat; beſides, their urines yield a thick and copious ſediment, to wit, when the nouriſhing Juyce, being mixed with the blood, is not aſſimilated, it ſtirs up in it a fervour, and being degenerate into an extraneous matter, exhales partly by ſweat through the Pores of the skin, and partly being tranſmitted to the urine, very much heightens its colour and conſiſtency.

Thus far of a red Urine, whoſe ſeveral ſpecies, but now related, have more degrees of intention and remiſſion, accordingly as the cauſes, altering the colour and conſiſtence in them, are either weaker or ſtronger.

4. As to what belongs to a green and black Urine, I confeſs I have never ſeen thoſe kind of deep colours (exactly like thoſe of Leeks and Ink) in any urine: but I imagine I may have ſeen the appearance of a greeniſh colour from a more deep yellow, and of a blackiſh urine from the ſame with a cloudy and ſomewhat a dark mixture, and from thence called by Authors a green and black Urine. But thoſe urines, coloured after that manner, are eſteemed either ſigns of the Jaundice, or of being diſtempered with ſome virulency of the blood, if they continue ſo conſtantly for ſome time: or ſuch urines, as occaſion offers, are variouſly changed, and are now of this or that, and preſently of another colour. So I have known Hypochondriacks wont to make ſuch urines, as it were critically for ſome time, and then afterwards to render them like ſound men. As to the firſt, when the Jaundice is very great upon them, that the aduſt portions of Sulphur and Salt remain a long time in the maſs of blood, they acquire by a long incoction a fulneſs of the yellow colour, at firſt green, and afterwards black, and impart the ſame to the Serum: For if the yellow Bile, being taken out of the bag of the Gall, and put into a Cucurbit, be expoſed to the gentle heat of a Bath, the ſame in a ſhort time will grow green, and afterwards appear like the blackeſt Ink: wherefore in the black Jaundice, which is only the yellow carried forth into a worſe ſtate, by its long ſtay or continuance, there is nothing more uſual than to make black urines. Beſides, theſe kind of urines ſometimes appear in a malignant Feaver, and in the Plague, alſo often from drinking of poyſon, and in this caſe it is for the moſt part a ſign of death, becauſe it argues the blood greatly corrupted, and the ſpirits profligated, and the bond of the mixture looſned, as it were the deadly or mortified diſtemper: even as where ſome part of our body, being diſtempered with an Ulcer, is afterward taken with a Gangrene or mortification, forthwith the flowing corrupt matter, which was at firſt white, wateriſh, or yellow, becomes black. Wherefore in the forementioned diſtempers, when the urine grows black, the Serum and the blood being wholly vitiated, the skin alſo is dyed outwardly with ſuch a colour. As to what belongs to urines periodically tinctured with a greeniſh colour, and eſpecially with black (which happen often to Hypochondriacks) it is moſt likely, that ſuch ariſe from the melancholick Feculencies laid up in the Spleen, and from thence, by reaſon of its congeſtion, too much flowing forth ſometimes, and confuſed with the blood: for ſuch a matter, being often poured into the Ventricle in ſome men, ſtirs up black Vomitings; alſo in others, the ſame being ſupp'd up from the blood paſſing through, may impart ſuffuſions of the ſame colours to the ſerous Juyce.

So much for the Colours of Urines, of which the more pale ariſe from too much Crudity, almoſt all the high-coloured, either from the Salt and Sulphur plentifully diſſolved, and ſometimes from the aduſt recrements throughly boiled in the Serum, or from the more thick contents of the urine; whether they be the Calx and remaining part of the aliment, degenerated in the concoction, or the waſting or melting of the pining body, or ſome part of it evilly diſtempered: what hath been ſaid may be better underſtood, if the means, whereby theſe kind of diſſolved things or contents are able variouſly to change the colour of the urine, be unfolded.

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The cauſes of the diverſity of appearances of colours, and their variouſly changing, as alſo of the cloudineſs and clearneſs in Urines, (as in all other Liquors) depend only on the various incidency and emerſion of the beams of light, as is hinted in another place, in the Tract of Fermentation: For if the ſubſtance of the liquor be rare and thin, with open Pores and paſſages, that the beams of light may eaſily paſs through, it is ſhining and clear like fountain-water: but if the Pores of the liquor be filled with contents, or little bodies ſwimming in it, ſo that the luminous beams are broken in their paſſage, but ſo that at length they may ſhew themſelves, according to thoſe various manners of refraction and emiſſion, there will appear a Citron, a Saffron, or red colour in a yet clear liquor. If that, in the little ſpaces of the Pores yet more obſtructed, the light cannot paſs through, there is a darkneſs induced: but then if the immerſed beams be a little or nothing reflected, the liquor will appear of a brown or dark colour; but if they are beaten back, according to the diverſe manner of reflection, a white, aſhy, or ſome other kind of appearance, is induced. From this being ſuppoſed, according as the liquor of the urine, ſometimes almoſt wholly deprived of Salt and Sulphur, and other things diſſolved, eaſily admits of light, ſometimes either very much ſtuffed, or elſe moderately with theſe kind of contents, either diſtorts the beams falling on them in their paſſage, or wholly imbibes them, or laſtly beats them back; it were eaſie to explicate all the Phænomena or appearances of colours and their conſiſtence.

It often happens, that the colour of the ſame Urine is variouſly changed: for what is made red, being expoſed to the air, becomes white, or of a dark colour, and then after a long time of a Citron colour: the reaſon of which is this, if I am not deceived, this kind of urine, when it is made, is red, becauſe the Pores of the Liquor are very full of contents; yet ſo long as they are dilated with heat, they tranſmit the rays of light, (although variouſly diſtorted) that they may at length ſhew themſelves or appear; but this urine is no ſooner expoſed to the cold, but that the Pores being ſtraitned, the ſite and poſition of the parts is changed in the contents, and by that means the paſſage of the beams of light is hindred: wherefore the liquor preſently becomes cloudy, and according as thoſe beams are reflected after this or that manner, a white, or brown, or ſome other kind of colour is induced: but at length the contents falling down towards the bottom with their weight, the Pores being freed, tranſmit again the rays of light, and do not diſtort them; wherefore a clear or a Citron colour appears.

From theſe things which have been ſpoken concerning the Colours of Urines, may appear what is the cauſe of the various conſiſtence of urines. For as the particles of Salt and Sulphur, of the aduſt matter, or nutritious Juyce, depraved in the aſſimilating, are more or leſs boiled in the Serum, urines alſo get their more thin or thick conſiſtency. It remains next that we ſpeak more clearly of the Contents in preternatural Urines, whereof we have often made mention.

CHAP. V.

Of the Contents in the Urines of ſick People.

WE ſuppoſe the Contents in the Urines of ſick people to be twofold, *viz.* either univerſal, which proceed from the maſs of Blood, and of the nervous Liquor, and reſpect the habit of the whole Body; or particular, which are the layings aſide or excrements of one bowel, or part ill affected, of which we ſhall ſpeak anon. Thoſe of the former kind, which come away from the whole, are either natural, *viz.* Filaments or ſmall threads conſtituting the Hypoſtaſis or ſettlement, as in ſound Urines; or preternatural, which chiefly are particles of the nutritious humour degenerate from aſſimilation, and conſtitute the more thick bodies of the ſediment in Urines; and laſtly to theſe, (if there be a feaveriſh intemperance) the aduſt matter of the blood after deflagration, and diluted in the ſerous Juyce, is added, and increaſes the bulk of the Contents.

But theſe Contents, both natural and preternatural, of Urines, repreſent themſelves after a various manner, as the blood more or leſs unduly grows hot, alſo as the

the aliments in the bowels and veſſels are variouſly concocted, and either the ſuperfluities or corruptions of the Chyme, from thence made, are waſhed away with the Serum: for if the nouriſhable humour tranſmitted to the blood, is not all perverted, but a great portion of it, laid upon the ſolid parts, is changed into nouriſhment, ſome parts of this alſo rightly made, being mixed with the Serum, impreſs yet ſome marks of an Hypoſtaſis in urines: Alſo from the aduſt or degenerate matter, a preternatural ſediment is framed, yet little and thin, neither doth it wholly blot out the appearances of this natural. Wherefore in the beginning and declination of a Feaver, ſometimes alſo in a Conſumption, or a Cachexy an Hypoſtaſis, though not ſo perfect, is perceived. If that the greater portion of the ſame Chyme, growing hot with the blood, by reaſon of the immoderate heat, is perverted into an heterogene matter, which afterward is ſent away with the Serum, as hurtful and unprofitable, preſently an obſcure and imperfect Hypoſtaſis appears; and beſides it, very many contents are ſeen in the urines, which heighten their colour and conſiſtency. Such an urine, which contains an Hypoſtaſis, though imperfect, together with other things of the ſame kind diſſolved in it, if it be kept in a warm place, the Hypoſtaſis will be perceived alone; but the reſt of the contents, comprehended in the pores of the urine, dilated by the heat, are made wholly inconſpicuous or not to be ſeen: yet afterwards the little ſpaces of the Pores being ſtraitned by cold, the ſame contents are precipitated, and by that means they render the ſite and poſition changed, and the urine troubled and cloudy, and blot out the appearance of the Hypoſtaſis. Theſe kind of urines in the better ſtate of Feavers, in a Catarrh, Cough, difficulty of perſpiration, fulneſs of humours, and in the more light Dyſcraſies are wont to be made.

But if in the more grievous ſtate of ſickneſs the Concoction be wholly vitiated, and the whole nutritious Juyce changed into a putrefaction, theſe kind of contents alſo may be perceived in the urine without an Hypoſtaſis, and ſignifies variouſly in diſeaſes, after their various ways of being precipitated, and ſinking down, and conſtituting a diverſe kind of ſediment; to wit, as the ſeparation of the parts ſucceed ſoon or late, or not at all; and as the matter falling down ſhall be little or much, or alſo of a white, red, or dark colour. I will briefly run through what is moſt notable and worthy obſervation concerning this thing.

1. This kind of Urine being full of contents, is not ſometimes at all precipitated, (unleſs the ſubſtance of the liquor be diſſolved by putrefaction a long time after) but remains a long while troubled and ſomewhat cloudy, with little bodies ſwimming through the whole. The reaſon of this is, either becauſe theſe contents are too much incocted in the Serum, ſo that the ſpirits implanted therein, cannot ſeparate the pure from the impure, the thick from the thin; as may be perceived in brewing Beer, if that the Mault be too much boiled, the liquor ſhall never grow clear: or elſe the urine remains troubled, becauſe it is wholly deſtitute of ſpirits, which may compel the parts of the liquor into the motion of Fermentation; as it uſually comes to paſs in Beer growing ſour by reaſon of Thunder, or of immoderate heat, and being infected with a troubled Feces or Lee, will ſcarce ever be rightly made clear again. This kind of urine is perceived for the moſt part in very dangerous Feavers, and ſometimes in a deſperate Cachexy, and always portends evil.

2. Sometimes it happens, that the Urine is ſo full of contents, that it begins to be troubled whilſt it is yet warm. I have often obſerved it, after this manner, in a ſlow Feaver, whoſe heat was gentle and more remiſs, to wit, in which the particles of the nutritious craſſament or ſubſtance are depraved, but being a little ſubdued by heat, or boiled in the Serum, they eaſily fall out of its pores: as when common Sulphur is boiled in Lye, if that before it be perfectly diſſolved, it be taken from the fire, the liquor at firſt clear and red, by reaſon of the quick precipitation of the diſſolved matter, becomes preſently troubled, dark, and of a ſomewhat whitiſh colour.

3. But what moſt uſually comes to paſs, that this ſort of Urine, big with contents, as long as it is hot, and ſome time after, ſeems clear and perſpicuous when it grows cold, is wont to be troubled, and as if ſome Runnet were infuſed to be precipitated according to all its parts; yet the ſame, if held near the fire, or in warm water for a little ſpace, ſhall grow clear again. The reaſon of this is already fully unfolded, where we ſpake of the Cauſes of Cloudineſs and of Clearneſs.

4. After that the Urine being expoſed to the cold, is precipitated in this manner, it

it may be obſerved by what means its contents deſcend to the bottom; for ſometimes they ſettle in a ſhort time: and if the liquor grows clear in the ſpace of two or three hours, it is a ſign that the liquor of the urine is not too thick, nor very much filled with Salt and Sulphur: wherefore in the beginning or declination of Feavers, when the heat is ſlack, ſuch an urine is moſt often made: ſometimes ſuch a ſettlement follows not but in the ſpace of many days; the reaſon of which is, becauſe the conſiſtence of the liquor is thicker than it ſhould be, therefore the contents or diſſolved things are not ſo eaſily let go from its embrace, that they may fall down to the bottom by their weight. Theſe kind of urines are wont to be made in the ſtate or height of Feavers, and moſt often precede an evil Criſis.

5. Of no leſs a diverſe kind are the ſediments which fall to the bottom. That I may paſs over in this place the filthy matter, and blood, ſand, gravel, and the like, depoſited from ſome parts, I ſhall mention thoſe which are the products of the whole body, and they for the moſt part are either white or brown, or red like Oker: If you ſtrain urine, when it hath ſtood long, through brown paper, you may collect theſe contents. I have often ſeen a whiteneſs like Chalk, and ſometimes red like Bole Armene, without doubt there is the ſame matter of all, to wit, the recrements of the deflagrated blood, and of the nutritious juyce depraved in the aſſimilating: which, as they are burnt by heat in our body, and diverſly perverted, appear alſo in the urine under a various colour and form; even as Antimony mixed with Nitre, as it is more or leſs calcined exhibits a Calx, now red, now Saffron colour, now yellow, now brown: The like reaſon is (as it ſeems) of the ſediments of urines, which are as it were the Calx of the ſulphureous and earthy matter burnt forth by the fire of the Feaver in the Viſcera and Veſſels.

6. Beſides theſe kinds of Contents, which happen in the Urines of ſick people, I have often obſerved, that after the urine had ſtood a long while, ſomething was affixed to the ſides of the glaſs like ſand, and indeed in divers figures; for now theſe little bodies like ſand grow together with a ſharp and unequal ſuperficies, now with ridges like the Cryſtals of Nitre, and ſome ſhine and are pellucid like Ice. I have ſeen theſe kind of Cryſtals fixed to the Urinal, ſometimes in the urines of thoſe troubled with a Dyſentery, alſo in thoſe troubled with pertinacious wakings. Sometimes in urines, when they have ſtood long, a certain Cream will ſwim on the top, as when Tartar is boiled in water: this kind of whitiſh cruſt growing together in the ſuperficies of the urine, is commonly thought to be fat and fattiſh things, and taken for the melting of the ſolid parts: wherefore ſuch as are wont to make ſuch an urine, are preſently pronounced to be conſumptive, and in a deſperate condition: But indeed that is only a ſaline concretion, which if put into the fire, will not melt, but grows hard into a cruſty ſubſtance. Yea both this and the other concreſcences of urines are as it were the Tartar brought forth in them by a certain Coagulation: But ſuch a concretion depends altogether on the particles of the fluid or acetous Salt, combined with others of the fixed or Alcaliſate Salt: For in every ſubject where there is a commixtion of the Salts of either kind, Cryſtallizations and Coagulations of a diverſe manner are cauſed, either ſpontaneouſly by Nature, or may be procured by artificial ſeparation: wherefore this kind of urine, on which this Cream ſwims, or that Cryſtals gather in the ſides of the Veſſels, indicates the blood to be departed from its ſweet and Balſamick nature (ſuch as depends on the volatile Salt) into an acid and corroſive, by reaſon of the flux and fixity of the ſaline Principle. Such an urine, if it be evaporated, leaves in the bottom of the Veſſel great plenty of Salt: the diſtempers wherein it is uſually found (as I have often obſerved) are ſpitting of blood, Atrophy, or general waſting, and the Hypochondriack diſpoſition.

In the Urines of ſick people it is worth obſervation, whether they dye the Urinal or not? For ſometimes in Feavers the urine is no ſooner put into the Glaſs, but preſently it darkens its ſides with a whitiſh cloud, and again at another time this does not happen: I ſuppoſe that the Glaſs is dyed, when the liquor of the urine is fuller of diſſolved Sulphur than its pores can contain within themſelves; as may be perceived in Lye, wherein common Sulphur or Antimony is boiled: Alſo every urine, if it ſtand in the Glaſs till it putrifie, will infect its ſides with a cruſt or cloud, ſometimes whitiſh, ſometimes reddiſh, ſometimes of another colour: for the frame of the liquor being looſned by putrefaction, the particles of the Sulphur being looſned from the bond of mixture ſtick to the Glaſs: But in the urines of ſick people ſometimes this preſently follows, becauſe the Sulphur is more copiouſly diſſolved than can be included in its pores.

As to what reſpects the particular Contents of Urines, they indeed are manifold, and may come from many parts and places: yet they moſt often depend on diſeaſes implanted about the Reins, Bladder, and Urinary paſſages: ſometimes it happens by reaſon of an Impoſthume in the Liver, Spleen, Lungs, or other Inward; or by reaſon of preternatural humours heaped up in thoſe places, and flowing out with their fulneſs, an extraneous matter is tranſmitted into the maſs of blood, and thence into the ſerous Juyce: but this happens more rarely, becauſe an Impoſthume being broken within, for the moſt part pours out its matter into the cavities of the Viſcera, from which there is no paſſage open into the urinary paſſages: beſides the maſs of blood flowing with impurities, does not preſently endeavour to ſend them forth by urine, but oftner by ſweat, ſpitting, breaking out of Wheals, Tumors, or by other ways of excretion. Wherefore it appears by common obſervation, that the other contents of urines (than which we have above cited) are chiefly ſent from the Reins and their dependences; the chief of which are ſand, ſtones, blood, matter, bits of fleſh, skins, branny or mealy ſediments, which for the moſt part ſignifie either the ſtony or an ulcerous diſtemper, or both together, planted beyond the emulgent Veſſels.

It is an uſual thing for ſome to void with their water, gravel or ſmall ſand of a red colour in great quantity; ſome of theſe are obnoxious to the ſtone in the Reins, and are frequently tormented with Nephritick fits: I have alſo known others without pain, or other grievous Symptom, for a long time to make a ſandy water. All urines whatſoever, if they ſtand for ſome time in a leaded or earthy glazed veſſel, affix this kind of red ſand to the ſides and bottom of the Pot, to wit, the volatile Salt of the urine is coagulated with the fixed Salt of the Metal: ſo when Sal Armoniac being mixed with the filings of Steel, Sea-Salt, or Vitriol is ſublimated, the elevated flours grow notably red: wherefore it ſeems that theſe kind of little ſands are begot in the Reins, for that the Salt of the urine is coagulated with the Tartarous feculencies laid up about the windings of the Reins, from whence the ſandy matter is made, which is preſently waſhed away by the ſerous Juyce paſſing through: Therefore the gravel that is ſo frequently made are no ſmall parts or fragments of a greater ſtone, (as is commonly thought) but extemporary products of the blood and Serum waſhing the winding paſſages of the Reins.

By what means little ſtones are produced in the Bladder or Reins, is not to be fully diſcourſed in this place: But without doubt it is done rather by Coagulation than Exſiccation or Excalefaction, by drying or heating. I have obſerved ſome ſick of the Stone in the Bladder, who after they have made water, were wont to void with great ſtriving and pain a thick and viſcous Juyce, which preſently hardned into a ſcaly matter: the ſmell of this was like Lye, and of ſuch a conſiſtence as Lye evaporated to a thickneſs, the liquor of which being made thick, preſently ſtiffens into a ſaline hardneſs. Leſſer ſtones ſometimes paſs through the urinary paſſages, and are carried out: the greater remain unmoved in their Cells. The places wherein they are uſually begotten are the narrow winding boſoms of the Reins, from thence the ſmaller ſlide into the Bladder, and if not excerned, they grow into great ſtones. I once ſaw many great ſtones ſhut up as it were in a Cheſt about the ſides of the Bladder between its Membranes; theſe without doubt being ſent from the Reins while ſmaller, remained in the paſſages of the Ureters, creeping between the Coats of the Bladder, and there by degrees did increaſe in bulk. A Matron ſo diſtempered long before her death, caſt out of the urinary paſſage a Membrane thick and broad, full of ſandy matter, which (as appeared after her body was opened) was part of the interior Tunick of the Bladder worn and broken by the ſtones there included.

It is ordinary for Nephritick people, or ſuch as are troubled with the Stone, frequently to void blood or matter with their Urine: for from a greater ſtone, and endued with ſharpneſs, the fleſh of the Reins is eaſily worn, and the mouths of the Veſſels opened, whereby blood flowing out tinges the urine; and when a ſolution of unity is cauſed in this manner in the Reins, an Ulcer moſt commonly follows, whereby matter and filthy ſtuff are poured out with the ſerous water, and conſtitute a plentiful and ſtinking ſediment in the urine: then the ſore being more inlarged by the Ulcer, more large profuſions of blood often follow, and the fleſh it ſelf of the Reins being worn away, and by degrees eaten off, is voided with the urine. I viſited once an ancient Woman, who daily voided with her urine, for many months, pure blood in great quantity; beſides, as often as ſhe made water, ſhe uſed to void in great

quantity

quantity pieces of fleſh, great gobbets, as it were the little Tubes of the Veſſels eaten away, that it was ſuſpected one of her Kidneys was all thus cut away from her body: yet afterwards by a vulnerary Decoction acidulated with Spirit of Vitriol, that bloody water was ſtaid, and this Woman lives ſtill well and in health. I knew another Matron, who uſed for a long time in making water to void at firſt blood with a purulent matter, and Membranes: then the bloody water ceaſing, for many years ſhe made a wateriſh urine with a copious ſediment, and white like ſnot, ſinking down to the bottom of the Urinal. Afterwards when ſhe began to want that ſediment, a feaveriſh intemperance followed with pains wandring here and there, with a languiſhing of ſtrength, and other dangerous Symptoms: and when this ſick Woman was brought into danger of her life, a Tumor ariſing in her left ſide about her Reins, and ripening into a Boil or Sore, by reaſon of the large flowing out of the matter, freed her: but yet an hollow and ſinuous Ulcer pouring out a thin matter, remained in that place during her life: and being ſometimes healed up, would preſently break out again. Scarce two years after this Noble Lady having endured the ſuppreſſion of her urine for fourteen days, became apoplectick and dyed. Her body being opened, her left Kidney was quite gone, in the place of it a membranous ſubſtance growing to the Loyns, infolding the extremities of the Veſſels and Ureter, was grown up: ſome prints or marks of the Ureter remained, but without any opening into the hollowneſs of the paſſage: yea a certain ichor or ſeroſity dropping out from the little mouths of the emulgent Artery, was carried outwardly into that ſinuous Ulcer. The other Kidney was very full of ſandy matter and ſmall ſtones; beſides, near the top of the Ureter a ſtone about the bigneſs of ones thumb was fixed, whoſe extremity was ſo fitted and firmly impacted to the paſſage or cavity of the Ureter, that it ſhut it up juſt like a Tap, and quite hindered the paſſage of the ſerous Juyce. The purulent matter comes into the urine, not only from the Reins, but ſometimes out of the Bladder and urinary paſſage diſtempered with an Ulcer; and ſometimes alſo a corrupt ſeed, or white flux, or menſtruous blood are poured into urines from the Veſſels and genital parts, and produce in them preternatural ſettlements.

4. In the Urines of ſick people are often ſeen abundance of white Contents compoſed of moſt ſmall bodies; which, when they are ſetled, fill up above half the liquor, and make it white and duskiſh, the reſt remaining limpid, and thin in the upper region of the Urinal: this kind of ſediment is called Mealy, becauſe it is like water imbued with meal. Concerning this it is doubtful, whether it proceeds from the whole maſs of blood, or only from the urinary Viſcera. It appears by obſervation, that the ſame ſort of urine is always made in the ſtone of the Bladder, alſo ſometimes by reaſon of the Kidney being oppreſſed with ſome great ſtone. I never ſaw ſuch a ſettlement in urines without a Nephritick diſtemper; wherefore I have thought it almoſt indubitable to be always a ſign of the Stone: And it ſeems that it ſhould wholly depend on the juyce or humour heaped up about the bulk or ſubſtance of the ſtone: For where the ſtone is fixed in the Kidney or Bladder, the nutritious humour is there perverted from aſſimilation, and degenerates into a more thick mucor, which uſes to be copiouſly heaped up; like Ichor, which by reaſon of a Pea put into an Iſſue, runs out plentifully. But this mucor or filth being waſhed with Serum, makes that white ſediment.

CHAP. VI.

Of Judgments to be given concerning the Urines of ſick People.

SO much for the Anatomy of Urines, wherein are unfolded their Elements and conſtitutive Principles, together with their chief Accidents, *viz.* Colour, Conſiſtence, and Contents, both what ought naturally to be in them *per eſſentiam* or eſſentially, and alſo what are wont to happen to them preternaturally, by reaſon of the body being ill affected. It will be eaſie for any one to accommodate this Hypotheſis to practice, and to give Judgment on Urines beholding them in the Urinal; for from what hath been ſaid it appears of what parts the Diſeaſes are made known by the inſpection of the Urines, and what the Urine ſignifies in each of them.

Concerning this ſubject there hath been enough ſaid by Authors; I ſhall therefore only touch upon it briefly, and lightly paſs it over.

Although the matter of Urine, *viz.* the Serum of the blood waſhes the whole region of the Body, and is circulated with the blood through all the ſeveral parts, yet it doth not lay open the condition and diſeaſes of them all, but only of thoſe to which it owes either the natural perfection and geneſis of it ſelf, or from which it receives every alteration: wherefore in ſome reſpect it ſhews the action and diſpoſition of the Viſcera ſerving to Concoction, and beſides denotes the temper and motion of the blood and humours in the Veſſels: but that any one ſhould pretend to know from the Urinal, and to divine a pain in the Head, an Impoſthume in the Throat, or any other Diſeaſe of any part, from whence nothing is communicated to the Serum, he ſhews rather his ignorance than the knowledge of any Diſeaſe.

Urines brought from ſick perſons ſometimes are wholly like thoſe of ſound peoples, and then they give no light to the diſeaſe or diſtempered part; but it may be lawful, having inſpected them, to ſay ſomething negatively, *viz.* that the Patient is free from a Feaver, that as to the Ventricle and Concoction of the food, they are indifferently well: wherefore unleſs he be inclining to a Conſumption, or is ſick of an Impoſthume, or ſome other diſeaſe of the unity being broken; whatſoever it be, the diſtemper ſeems not very dangerous or hard to be cured.

But in the mean time I would not have him declare any thing raſhly, nor proceed farther than he can with ſafety return: for I have often obſerved in ſome moſt grievous diſtempers, *viz.* in a malignant Feaver, when with loſs of ſtrength, a weak and unequal Pulſe, eruption of Spots, and other dangerous Symptoms, the Patients have been deſperately ſick, that the urines as to the colour, conſiſtence, and Hypoſtaſis, have been laudable, as in ſound perſons, ſo that in ſuch a caſe the Phyſician by only viewing the Urine, as to his Prognoſtication had grievouſly erred: wherefore there is ſcarce credit to be given to the ſingle teſtimony of the Urine, unleſs there be other ſigns agreeable; but that it is a lyar in the Plague and malignant Feavers, and deceives: the reaſon is, that in thoſe diſeaſes the blood is leiſurely, and as it were ſilently corrupted, ſometimes without any great fervour: and ſo, although its liquor be infected by Coagulation, or by mortification or deadneſs; yet becauſe it doth not burn out much at the ſame time, ſo as to make an heap of aduſt matter, as of Aſhes, the Serum is little or nothing altered from its uſual diſpoſition or tenour: Beſides, ſometimes when in ſuch a ſickneſs the blood grows very hot, whatever of excrementitious is heaped up in its maſs, is preſently transferred to the Brain and nervous ſtock: wherefore the ſerous water being free from preternatural contents, remains after its uſual manner; beſides this caſe, when the Urines appear of a deep colour, troubled, and without any ſediment, there is no reaſon why the Piſs-prophet ſhould make a Prognoſtication.

As often as the Urines of ſick people are unlike thoſe of ſound, either ſomething natural is wanting, or what is preternatural is added, or it happens both together.

1. There may be wanting Colour, Conſiſtence, Contents, and Quantity. If the Colour be more remiſs than it ſhould, and the Liquor paler, it indicates Crudity, and a defect of making Spirits, to wit, that the nouriſhing Juyce is not rightly concocted or exalted either in the Viſcera or in the Veſſels; ſo that the ſaline and ſulphureous Particles being carried out together, following the diſtribution as it were the diſtillation of the Serum, might throughly ſtick to the ſame, and impart alſo to it the tincture: wherefore ſuch Urine being viewed from theſe kind of Symptoms, you may unfitly divine, that there is a weight in the Ventricle, want of Appetite, evil Digeſtion, a tenſion in the Hypochondria, an unfitneſs for motion, ſleepineſs, difficult breathing, and a frequent palpitation of the Heart upon exerciſe, a pale colour, a ſwelling of the Feet and Belly, you may ſay they are in danger of falling (if not already fallen) into a Cachexy or Dropſie, and if it be a Maid, that ſhe is troubled with Longings and the Green-ſickneſs.

If the Colour of Urines be remitted in a Feaver without a Criſis, it is a ſign that the fermentative matter or aduſt recrements of the blood are ſeparated from the boſom of the blood, and fixed ſomewhere, which for the moſt part happens in the Brain; and for that cauſe ſuch Urines uſe to foretel a Delirium or Phrenſie; in thoſe troubled with the Stone, a ſudden alteration of the urine into a pale and watry colour, denotes the approach of a Fit.

A copious and pale Urine often ſhews the too great reſolution or melting of the Salts,

Salts, by reaſon whereof the ſeroſities are ſent away as it were in a flood from the whole body, and chiefly from the nervous parts: ſuch an Excretion ſometimes is healthful, and as it were critical, when the ſuperfluities happen only to be carried away: ſometimes it is ſymptomatick, and cauſes a great debility, to wit, becauſe the nutritious Juyce and the good humours are purged out.

If the Conſiſtence be thin, and the Liquor pale, it argues Crudity, want of Spirits, or too much Drinking, or the Nephritick diſtemper: if it be of a flame-colour, it is a ſign of an intermitting Tertian Feaver.

If the Contents be wanting, and it be pale, want of Concoction is ſignified, and a Cachectick diſtemper of the body. But if it be of a Citron colour, and the conſiſtency mean, without Hypoſtaſis, you may ſuppoſe the Patient to have uſed too much labour or exerciſe; or to be frequently diſtempered with Sweats in the night, or perhaps to have an Atrophy, or general waſting, or to be inclining to a Conſumption.

If the Urine be continually made in a leſſer quantity than it ſhould, unleſs there be a larger tranſpiration, it is a ſign that the blood is not ſufficiently purged from the ſerous Juyce: wherefore there is a neceſſity that it become more watry, and that at length a Cachectical diſpoſition of the body, or a Dropſie be brought in. But if it be ſuddenly ſuppreſſed, or made with pain and difficulty, it is a ſign of the Stone or Gravel.

2. Something is added to the Urine, to wit, when the colour is heightned, and in the mean time the conſiſtency and contents ſhew themſelves in due meaſure, there may then be a ſuſpicion of a Feaveriſh or Hectical diſtemper: perhaps ſome evident cauſe may precede, as the uſe of Baths, Heat, Surfeit, or immoderate Exerciſe, which might have heated the blood; or Cold may have heedleſly been taken, whence may ariſe a ſhutting up of the Pores, and difficulty of Perſpiration. If the urine be of a Saffron-colour, and tinges the Linen with yellowneſs, you may ſay it is the Jaundice: but if it be of a Saffron-colour or red without a Feaver, and doth not dye Linen, it ſhews for the moſt part the Scurvy or Hypochondriack diſpoſition.

Though the Colour and Hypoſtaſis may be in good order, preternatural Contents are often in the Urine; therefore when it grows cold it is troubled, and makes a ſediment ſometimes white, and then there is a ſuſpicion of the blood's overflowing with filth, alſo of an impure Ventricle ſtuffed with excrementitious matter, or with Worms; ſometimes red, which often happens by reaſon of Tranſpiration being hindred, a Conſumption, and ſometimes by reaſon of a Surfeit, or the beginning of a Feaver.

Preternatural and thicker Contents are ſometimes in Urines, ſhewing themſelves naturally, which denotes a diſtemper of ſome part about the urinary paſſages; whence Matter, Filth, Blood, the Whites, corrupt Seed, or the like, are mixed with the Urine: and you may eaſily know by asking how, and in what place the Patient is ill, what part is diſtempered; and the ſtraining the ſediments of thoſe urines will ſhew what the diſeaſe is, and you may be more ſure of the nature of the diſtemper.

When Urines have ſtood ſome time, copious white ſediments are thence made; it is not eaſie at firſt ſight to know from whence they come, *viz.* whether from the whole maſs of blood, or only from a particular bowel imployed for the preparations of the Serum or the Seed. For the impurities of the blood and nervous juyce being depoſited under a mealy ſpecies in the bottom of the Urinal, are wont to cauſe a ſuſpicion in the Phyſician of the Whites in Women, and of the Running of the Reins in Men: ſuch like contents are alſo ſeen in Urines, which proceed from the urinary and ſpermatick parts. Amidſt theſe ambiguities, leſt you ſhould gueſs raſhly and confidently by the urine, and aſſert uncertain for certain things, and falſhood for truth, the difference of theſe kind of urines ought to be indicated after this manner. If the contents be univerſal, and their ſigns be to be applied to the maſs of blood; for the moſt part theſe preſently after the making (unleſs ſometimes by chance in a Critical ſeparation) are wholly inconſpicuous (as in a thinner ſubſtance,) then the urine being troubled by cold, they deſcend ſlowly to the bottom; and being ſetled, and the Urinal heated, they diſappear again. But if theſe white ſettlements are ſent from a particular neſt, they preſently diſturb and thicken the urine newly made, are ſoon precipitated, and vaniſh not by heat. But that it may appear to what bowel theſe kind of particular contents ſhould be aſcribed, 'tis eaſily made known to Learned men by other circumſtances.

3. The

3. The Urine is ſometimes wholly altered from the natural ſtate; the colour and contents which ſhould be therein are wanting, and ſtrange things are in their place; then indeed is indicated that there is an intemperance in the whole body, and that the Concoction in the Bowels and Veſſels is depraved; you may ſay the Patient is ſick of a Feaver; and thence by asking, you may learn and preſently pronounce that he is diſtempered with the Head-ach, Thirſt, Heat, queaſineſs of Stomach, want of ſleep, and by conſequence with other Symptoms.

It happens ſometimes, that the Urine declines from its natural ſtate, yet not to ſhew the diſtemper the Patient complains of, but either the cauſe of the diſeaſe, or the conſent of ſome other part with the diſtempered; as if any one ſhould complain of a cruel Head ach, or trembling of the Heart, and make a watry Urine, that doth not denote thoſe diſtempers, but only a crudity in the Ventricle, and ſome obſtructions about the Spleen and Viſcera; which may be the cauſe of thoſe diſtempers: I ſay in this caſe, the urine being inſpected, the chief indications are taken about the Method of Curing, and we muſt not uſe Cephalick or Cardiack Remedies, but either Catharticks, which cauſe Vomit or Purging, or Openers, and eſpecially Chalybeats: But the urine is ſometimes vitiated, and yet its ſignification is wholly a ſtranger to the diſtemper the Patient complains of, as if any one were ſubject to the ſleepy diſeaſe, or a Lethargy, and makes it red and full of preternatural contents; its inſpection ſuggeſts chiefly coindications, *viz.* that we inſiſt not on too hot, but temperate Remedies.

The chief uſe of Inſpection of Urines will be for the obſerving the ſtate and progreſs of every diſeaſe, as alſo the alterations towards health or death. For in Chronical diſeaſes, by daily inſpecting the urine, is made known to the Phyſician, by what degrees the ſickneſs may increaſe day by day; at what time purging or altering Remedies will be moſt fit, and what Medicines will be moſt profitable: hence is to be obſerved, whether Nature prevails on the diſeaſe or not; and a moſt certain Prognoſtication may be drawn from hence, either of the hope or danger of health; to wit, according as the ſigns of Concoction or Crudity appear in the Urines. In acute diſeaſes, hence the ſtate and height of the Feaver may be beſt known, at what time the Criſes may be expected, and with what ſucceſs; when it is beſt to inſiſt upon Evacuations, and when on Cordials. The Compaſs is not beheld with more certainty and diligence by the Mariner or Steers-man, than the appearances of Urines ought to be obſerved by the Phyſician for fit times and ways of Curing.

Theſe were what I had to had to ſay concerning the Judgments of Urine, not collected from the vain Traditions of Quacks, but what are conſonant to reaſon and truth. Beſides I know there are ordinarily delivered by Medicaſters and Old women almoſt an innumerable company of Rules and Directions of Urine-divination, that the Urinal is no ſooner inſpected, but they will undertake to divine, whether it be a man or a woman that is ſick, how long they have been ſick, what their diſeaſe is, and whether the diſtemper ſhall end in health or death; whether the Patient be ſubject to the paſſions of Love or Sadneſs, whether a Woman hath conceived with Child or not, or whether it ſhall be a Boy or a Girl, and an hundred other the like; in which uſing a vain conjecture, they either impoſe by their confidence on the minds of the credulous, or (which is more frequently their cuſtom) by a cunning craftineſs they other ways ſift out the matter by inquiring, and falſly aſcribe it to their knowledge in the inſpection of Urine.

CHAP. VII.

Of the Examination and various ways of proving of Urines.

ALthough the buſineſs of the Examination and Inſpection of Urines ſeems commonly only a ſimple thing (*viz.* the Medicaſters and Quacks for the moſt part behold the Urine ſent in a Glaſs, ſhake it a little, and preſently give Judgment) yet to thoſe who honeſtly endeavour the recovery of the ſick, the matter ſeems a little more intricate, and they uſe to obſerve ſeveral circumſtances concerning Judgment by Urine; which being omitted, nothing indeed can be certainly or directly

rectly learnt in the Medicinal Practice from the Urinal. Moreover, in some diseases, besides the mere inspection of the Glass, there are other ways of tryal to be had, by which, what lies hid in the Urines, and out of sight, may be made clear: from whence some not unprofitably taking care of the separation of Urine more accurately, have used to evaporate, distil, putrifie, and precipitate them. Wherefore we shall speak briefly of the right manner of inspecting Urine, and in some cases of the Analysis or separation variously to be instituted.

When the Urine of the Patient is offered to the Physician, if it hath first stood for some time in the Glass, and if the liquor be clear, the Hypostasis as it were gathered into a little cloud, and if the rest of the contents sink down to the bottom, there is nothing more wanting, but that forthwith a prognostick sentence may be given. But if the Urine be newly poured into the Urinal, or be troubled by a former shaking, you must stay till the confused parts be separated, and the settlement have acquired its due place. If the Liquor be full of contents, and the Pores straitned, it becomes troubled and dark, and the Glass must be put in a warm place, till the urine grow clear again, and then let it be placed for some time near the fire, that whilst the preternatural or more thin contents are absorpt by the Pores dilated by the heat, the more thick may fall down to the bottom, and the filaments or little rags making the Hypostasis, (if there be any) may be gathered together below, or in the middle region; for so will appear what is the power of Nature, and what of the Disease: Also in Feavers, the degree of heat and effervescency, the concoction or depravation of the nutritious Juyce, also the congestion or heaping together of the adust matter in the blood, and its separation begun, or wholly frustrated, may somewhat appear by the signification taken from Urines; wherefore you ought to proceed after this manner, when the urine is brought from far, to wit, whose Particles are disturbed by much shaking, unless it be kept for some time in a warm place, they will not easily get again their due place of position. But if you often visit any Patient that keeps his bed, it will be convenient, that the urine newly made, and put into an Urinal, be placed near a Stove, where, whilst it grows moderately hot, the several parts may, after the best manner, be disposed to a settlement without any trouble or disturbance.

Afterwards the Urine thus naked, and as it were disrobed from any covering, is offered to the sight, the next caution will be, lest any of its Phænomena or appearances being accidentally contracted, and not properly belonging to it, may impose upon the Physician: which indeed sometimes happens, by reason of alterations caused in them by food taken, and which chiefly consist in the colour and smell of urines, being variously changed besides Nature, and the expectation of the Physician.

For it is an errour commonly committed, when the Urine being yellow, and tinging the linen by the taking of Rhubarb, Saffron, Sanders, and the like, undoubtedly to believe it a sign of the Jaundice; also the urine being imbued with blackness by the taking of Cassia, to attribute it to the melancholick Tumor or blackBile; also when the urine is deep colour'd by taking of Pulse-broth, or a Decoction of Madder, or other drinks, we falsly suppose it to indicate a feaverish intemperance. It often happens from the drinking plentfully thin liquor, the urine is lessened of its high colour beyond expectation, and heightned by the drinking of strong drink or hotter things: unless the Physician take notice of these kinds of mutations, he will give but a false Judgment concerning Urines by looking on them. When therefore the colour is changed in the urines without any manifest cause, the manner of living must be inquired into, if that the alteration proceeds from what is eaten or drunk, that it may not be wrongfully ascribed to the disease. A question will here arise, why forasmuch as most things taken in at the mouth, before they go into urine, wholly lose all their colour; yet some others, which being eaten, so pertinaciously impress a tincture to the Serum, that they pass untouched through all the strait turnings and windings of the passages? The reason or cause of which consists chiefly in this, that some mixtures have the constitutive parts of their colour or dye very subtil, and those highly volatile; wherefore these being taken only in a small quantity, dye the whole mass of the Chyle with their colour; and from thence the nutritious Juyce conveyed to the blood, ascends coloured, and its vehicle, *viz.* the serous Latex, is sent away still dyed or tinctured.

What the odour of Urines of sound people may be, is obvious to every one that can smell, *viz.* whilst it is fresh made, it is not very ungrateful, by reason of the sulphureous and saline Particles bound up in the substance of the liquor; when it hath stood

ſtood ſo long, that the Sulphur begins to exhale, ſharpned with the Salt, the mixture being looſned, it putrifies and ſtinks grievouſly. Beſides we may obſerve, that ſometimes there ariſes from urines freſh made, a ſweet odour like Violets, and ſometimes they offend the noſe with a very ungrateful ſtink. The former doth not depend either on an healthful or unhealthful condition of the body, but is produced only from things taken: Turpentine, Nutmeg, and other Gumms and Spices taken in at the mouth, though of a diverſe nature and operation, impart a like ſuavity or ſweetneſs to the urine. The reaſon of this ſeems to be, becauſe in theſe kind of mixtures very many particles of the purer Sulphur (that is imbued with Spirits) are eminent; which, for that they are volatile, being confuſed with the Serum, are not contained in the bond of the mixture: wherefore the urine being made, theſe alone leap out, and not accompanied with others of the ſtinking urine, and ſo diffuſe a grateful odour; which, although it proceeds from divers kind of things eaten, yet remains ſtill after the ſame manner like Violets, for that in all, thoſe ſulphureous Particles are ſet free by digeſtion from the others joyned with them in the ſame concrete, nor are infected by different ones from the urine. But as to what reſpects the ſtinking urine, that ſometimes proceeds from an Ulcer about the Reins, Bladder, or urinary paſſages; ſometimes alſo it is raiſed from a too hot intemperance of the Reins, or of the whole Body: for when the Sulphur is deeply boiled in the Serum, its particles being ſharpned by the Salines, (for that they are leſs cloſely ſhut up) do preſently evaporate, and grievouſly affect the ſenſe of ſmelling; but beſides, ſometimes urines contract a ſtink from things eaten. For the Balſam of Sulphur, Garlick, Aſparagus, Cider, Rheniſh Wine, and many other things taken at the mouth, do cauſe a ſtrong ſmell in the urine. If the reaſon of this be demanded, we ſay that ſuch things which impart a ſtink to the urine, alſo provoke it in a more plentiful quantity: wherefore it ſeems that theſe ſort of things being taken, fuſe the blood, and greatly haſten the precipitation of the Serum: and when by this means the ſerous Juyce is pulled away as it were abruptly from the blood, the frame of the liquor is made lax, nor are its parts exactly mixed, nor contained in an equal bond of diſpoſition: wherefore when this urine is made from the body, its frame or ſubſtance being before looſned, the particles of the more groſs Sulphur (that is combined with Salt) preſently breathe out, and ſo diffuſe a ſtinking ſmell. For urine thus altered by things taken, ſeems very like to Lye, wherein Antimony or common Sulphur is boiled, and is afterwards inſtilled into ſome acid thing, becauſe in this Decoction, as alſo in ſuch urine, the frame of the liquor being unlocked, the little ſulphureous bodies leap out, and affect the ſenſory with a ſtinking ſmell.

If that any one more curious in the ſearch of Urines, ſhall ſeek further than the examination of the ſight and ſmell, he may eaſily, by a divers manual operation, reſolve them into parts, and as it were diſſect them to the life, and thence draw Medicinal directions of no ſmall moment; for that in many Chronical diſeaſes where the Dyſcraſies of the blood are more exactly to be ſought into, that the proportion and temperature of Salt and Sulphur may be truly found in it, it is ſometimes convenient to evaporate urines, or to diſtil them; ſomething alſo is to be learned from them, being precipitated, or looſned by putrefaction. I knew an honeſt Woman greatly afflicted with a ſcaly filthineſs of the skin, which ſhe was daily wont to ſcratch off in great plenty, as it were a branny matter. Her urine being evaporated in a little Skillet, left ſticking to the ſides of the Veſſel, a cruſty and ſalt ſediment, like the excrement of her skin. Not long ſince I evaporated the urine of a Gentleman, grievouſly ſubject to convulſive motions and painful ſtretchings out of the Muſcles, in the bottom of which there remained a quantity of ſalt and tartarous matter, exceeding the weight of half the liquor. By this means it will be an eaſie thing to find the proportion of the ſaline Principle in the blood and humours: but whether this Salt be volatile, or becomes fixed beyond meaſure, the diſtillation of the urine will preſently ſhew: For if the Spirit (ſo called) be copiouſly drawn out of the urine, and that beſides the Salt aſcends into the Alembeck, it is a ſign of volatilization: but the contrary to this argues the fixity of the Salt.

As the evaporation and diſtillation of the Urine ſhew the power of the ſaline Principle, ſo the precipitation, putrefaction, and Sulphur lay open the thicker contents of the Urine, as it were in weight and meaſure. As to the former, although the liquor of the urine be ſalt, and often big with contents, yet for as much as its ſaline Particles are not (as it is wont to be in moſt Menſtruums) either wholly in a ſtate of fixity,

fixity, or of flux, but for the moſt part volatile, therefore it is not eaſily nor preſently by any ſalt infuſion ſubject to putrefaction; the Spirit of Vitriol and other acetous things effect nothing: the Salt of Tartar ſtirs up a little perturbation. But the ſolution of Alum, for that it greatly conſtrains into a little ſpace, preſently diſturbs the whole liquor extremely, and delivers all the contents of the urines, as they were thruſt out of their dens, to be ſeen openly by the eyes. Wherefore by this means, without any long ſtay for ſettlement, you may preſently know how much of ſulphureous and earthy matter is depoſed from the maſs of blood for recrements in the bottom.

The putrefaction of Urines is wont to exhibit the ſeveral particles of every kind, yet more diſtinct, and diſpoſed as it were by themſelves; for if the urine be left to ſtand unmoved for many days in the Glaſs, the colour, odour, and conſiſtency will be very much altered, for the colour will be deeper, the ſmell ungrateful, and highly ſtinking, the conſiſtency thicker, and will have on the ſuperficies a downineſs or hoarineſs, ſometimes whitiſh, ſometimes bluiſh; there will be alſo fixed in the bottom of the Veſſel a thick and copious ſediment, and often on the ſides a ſandy or tartareous cruſt, of a whitiſh or Aſh-colour. From theſe kind of appearances, and as the urines ſooner or later putrifie, and ſo are more or leſs altered from their former ſtate, it may be conjectured what the proportion of Salt or Sulphur may be, whether of them exceeds the other: alſo no unfaithful Judgment of the quality and plenty of the earthy matter or the contents may be taken from hence.

And thus, Sir, at length you have the Doctrine or Method of Separation of Urine, ſuch as our unskilfulneſs hath rendred it: I deſire you would be pleaſed not only to pardon the errours and barrenneſs of this Diſcourſe, but alſo to excuſe it in other things, becauſe at firſt writ by your perſwaſion, and then by your command and requeſt made publick. Wherefore pray take care of this child hardly brought forth and almoſt an abortive, and as it were expoſed and deſervedly laid at your door, without portion. Farewel.

Two Physical and Medical

EXERCITATIONS,

VIZ.

I. Of the Accension of the Blood.

II. Of Musculary Motion.

The first Medical and Physical

DISCOURSE.

Of the growing hot or inkindling of the Blood.

IT is long since I designed to print my Meditations concerning the remaining Pathology of the Brain and Nervous stock: But when many Diseases of that kind affect the animal Spirits, and not rarely the whole Hypostasis of the corporeal Soul more immediately than the Humors or solid Parts; I therefore thought it necessary first to publish the Disquisitions of the nature of this Soul, and its manner of subsisting, and also of its Parts and Powers, that from these things rightly known, its preternatural Passions may at length be the better discovered. But concerning these very hard matters, and difficult to be unfolded, when I had begun to frame (as I think) probable and rational Arguments, I saw well that they would be looked upon and laughed at by some as unusual things and Paradoxes; which indeed it becomes me not to take ill, but to let every one freely to enjoy his own sense, and to use in all things his own opinion and judgment. Among the many things conjecturally proposed by me, (which I could not avoid) two chief Arguments are opposed, to wit, that I had affirmed, that the blood for the continuing of life was inkindled, and that the animal Spirits, for the motive act, were exploded: which terms, though perhaps they may sound rough and strange to be applied to the animal œconomy; yet if any one shall weigh the Reasons and Arguments which do perswade to the truth of either opinion, I doubt not, but that there will be none who will not give their assent, or easily pardon me for mine. In the first place therefore, because there are so many opinions concerning the growing hot of the Blood, for that some attribute it to an innate heat, others to a flame in the Heart, some also to a fermentation of the bloody mass, and others to its inkindling; therefore I shall endeavour more narrowly to introspect the matter, and as much as I am able, to build upon a more certain Ratiocination, its genuine Cause, though very abstruse.

We have formerly discoursed concerning that Soul, which is common to the more perfect Beasts, with that subordinate or more inferiour of Man, and have shewed it to be indeed Corporeal, and to consist of two parts; the one of these rooted in the blood we called a Flame, and the other dwelling in the Brain and nervous stock, Light. As we shall here only treat of the former, I think it will be no difficult matter to make use of the same Reasons and Instances, which truly conclude, or at least very like truth, that in the first place the blood is animate or hath life: secondly,

ly, that this Animation is in its accenſion or inkindling, or conſiſts in an affection moſt analogical to this.

1. Not only the opinions of Philoſophers, but the undoubted teſtimony of the Sacred Scripture plainly aſſerts the animation of the blood: to wit, the uſe of blood was forbidden in the Moſaical Law, for this reaſon, becauſe the Blood is the Life or Soul; which is alſo apparent by the obſervation of the moſt famous *Harvey*, for that its motion is to be obſerved by the eye, ſhews that it firſt lives and laſt dyes. For the greater proof of this, it is commonly known that Animals only live ſo long as the blood remains in its due plenty and motion; and that they preſently dye, if either too great a quantity of this be taken away, or its motion ſuppreſſed.

But as to the ſecond Propoſition, to wit, that the life or ſoul of the fervent blood depends upon its inkindling; this will appear probable, if I ſhall ſhew: Firſt, that the liquor of the blood ought to be very hot in the more perfect living Creatures. Secondly, that this growing hot can be produced or conſerved in the blood by no other means beſides accenſion or inkindling. Thirdly, that ſome chief affections, as it were proper paſſions of fire and flame, are agreeable to the life only of the blood growing hot. Fourthly and laſtly, theſe being clearly ſhewn, ſome other leſs ſignal accidents and properties, in which common flame and life agree, are added, and alſo we will unfold how and in what reſpect they differ among themſelves.

As to the firſt we affirm, that the blood is perpetually moved in all living Creatures; beſides in the more perfect it doth eſtuate or grow hot in act. Indeed its undiſcontinued motion is required, both for the conſervation of the diſpoſition of the blood it ſelf, whoſe liquor would otherwiſe be ſubject to ſtagnation and putrefaction, as alſo that being carried about in the whole body, it might be able to give a due tribute to all parts. For that the offices of the blood, at leaſt in the more perfect living Creatures, are divers and manifold, *viz.* to inſtil matter in the Brain and nervous ſtock for the animal Spirits to diſpenſe the nutritious Juyce into all the ſolid parts, to ſuggeſt to the motive parts an elaſtic Copula, and beſides to ſeparate all recrements and worn out Particles, and to put them aſide into convenient Emunctories.

But although the mere motion of the Blood in leſs perfect Animals, or at leaſt its moderate ſwelling up, ſuch as may be perceived in Wine and other Liquors agitated into Fermentation, is able to ſuſtain and perform the œconomy of Nature; to wit, for as much as both a crude nutriment is every where received from the river of the blood, though cool, continually flowing into all parts of the whole Body, and that fewer ſpirits and more thick, as it were ſeparated by percolation or ſtraining, enter the Brain and nervous ſtock with that plenty, that may ſuffice for local motion, and the Organs of the few ſenſes to be rudely actuated: yet the blood watering the bodies of more perfect Animals, require offices of a far more excellent kind; for it ought not only to be carried about with a continual and more rapid motion, but very much to ſwell up, yea actually to grow hot or effervent: to wit, for that end, that its frame or ſubſtance being very much looſned, it may more copiouſly ſend forth the reſpective Particles of various kinds, every where falling off from it, and may diſpoſe them here and there for the uſe and wants of Nature.

But firſt, for that the animal Spirits are continually to be ſupplied in great plenty from the maſs of blood, and that there is need for the elaſtic Particles requiſite for the locomotive function, to be thence perpetually poured into all the Muſcles, it ſeems very neceſſary that the liquor from whence theſe generous and manifold ſupplements are drawn ſhould be actually hot, or rather ſhould burn forth; to wit, that the aforeſaid Particles, not ſufficiently to be unlocked but by heat or burning, ſhould freely run out from the ſubſtance or frame of the liquor: which truly is manifeſt, becauſe from Wine, and alſo from the ſame bloody Liquor, and all other ſpirituous things, a ſubtil and ſpirituous humour is copiouſly drawn, but not to be performed by diſtillation without heat or fire. Yea the ſulphureous Particles, although they are leſs apt to be exhaled from any Liquor, yet they moſt readily fly out by inkindling the ſubject. By theſe there is an apparent neceſſity of the blood's growing hot for the perfection of the animal as well as vital function; but that it may appear by what means this is done, to wit, whether by Accenſion, or by Fermentation, or by any other way, we ſhall firſt in general inquire, by what means, and for what cauſes any liquid things are wont to grow hot; then we ſhall conſider, to which of theſe the growing hot of the blood ought to be attributed.

Concerning theſe we ſay, that there are only three ways, or ſo many kinds of cauſes, by which Liquors conceive a heat, *viz.* firſt, by fire or heat being put to them, as when water is made to ſeeth or boil over the fire, or that it grows hot by the heat of the Sun, a Bath, or Stove, or by the diſſolution of quick Lime; inſtances of all which are commonly known. For the ſame reaſon Bath-waters ſeem to boil. For, that we may inſtance in our own Baths, to wit, they are impregnated neither with Sulphur nor fixed Salt, as I have plainly experimented, by diſtilling and evaporating them, and by pouring into them precipitating Liquors; yea by diſſolving them with Sulphur, and many other ways. They moſt reſemble Lime-water, and they, as we believe, grow hot from a like cauſe, to wit, by imbibing the fiery little bodies ſomewhere hid within the Earth. Of theſe, unleſs it had been ſuperfluous, we had here given a fuller deſcription, which may perhaps be done at ſome other time. Secondly, when ſaline Corroſives, which are of a diverſe kind, being mingled with themſelves, or with ſulphureous things, work mutually one on another with a great ſtrife and agitation of Particles, and oftentimes excite heat, yea ſometimes fume and flame; as when the Spirit and Butter of Antimony are poured to, or mixed with ſtygian Water, wherein lixivial Salts are melted, or with Oyl of Turpentine, or other diſtilled things; beſides when corroſive Liquors eat metallick Bodies, they often grow hot. Thirdly, and the only way beſides (as I ſuppoſe) whereby a liquid thing is made hot, is when any humour, being very much imbued with Sulphur or Spirit, conceives a burning by putting a flame to it, and ſo grows hot by burning forth. This is ordinarily ſeen in oily or very ſpirituous Liquors, being inkindled and inflamed.

There remain indeed ſome other ways of Calefaction, to wit, Fermentation, Putrefaction, and Attrition, whereby more thick Bodies, or Solids, often conceive a fervour, but they produce not ſuch an effect in Liquids: whilſt the mealy Maſs or Dough is fermented, the active Particles being ſtirred up into motion, unfold themſelves on every ſide, and lift up the bulk or ſubſtance of the ſubject; in the mean time, for as much as the ſulphureous Particles being agitated with them, take hold one of another, and begin to be combined, a certain heat, though more remiſs, is excited; in like manner from Putrefaction, Dung or wet Hay get an heat, to wit, for as much as the ſulphureous Particles, within included, are very thickly heaped up together, then being combined together, they break out in troops: yet no Liquors, either thin or thick, whether they ferment or putrifie, do for that reaſon at any time grow hot: For Wines, whilſt in fermenting they break in pieces the ſides of the Tun, or overflow the top of the Veſſel with a great noiſe and ebullition, do not actually grow hot, yea not ſo much as grow warm. The blood being let out of the Body, and placed in convenient Glaſſes, either to ferment or putrifie, doth not get any actual heat: yet in truth we grant the Blood in living Creatures to be fermented, and by fermenting to be putrified, yea and ſome other offices of the animal œconomy to perform the ſame: moreover, we have formerly ſhewed from its Fermentation being hindred, or too much increaſed, or otherwiſe depraved, divers kinds of diſeaſes to be produced: yet we deny the heat of the blood to be excited by Fermentation. Becauſe neither the blood of more frigid Animals, nor Wines, nor any other Liquors, though agitated with the higheſt Fermentation, are for that reaſon actually hot. And indeed the reaſon ſeems evident enough, to wit, becauſe the ſulphureous Particles being raiſed up in the more thick ſubjects, though they lay hold on one another mutually, and being more thickly heaped together, raiſe up heat: yet in Liquids, the ſame kind of Particles, howeyer ſtirred up or agitated, are immediately disjoyned by the watry coming between, and are hindred from their mutual embrace and combination; ſo that they cannot of themſelves produce an actual heat: For the ſame reaſon, hard Bodies being rubbed one againſt another, or violently knocked or bruiſed, do not only produce heat, but oftentimes fire; whenas yet Liquids, however ſhaken and agitated, do not grow warm. Therefore as there are only three ways, whereby actual heat may be begotten in all Liquors, we ſhall inquire to which of theſe the heat of the Blood may be aſcribed.

Firſt, Some ſay it is the firſt way, from the opinion both of the Ancients, and of ſome of the Moderns: the Blood is ſaid to grow hot, by reaſon of ſome hot thing put to it, to wit, whilſt thoſe affirm an innate heat, and theſe a little flame to be placed in the Heart, and to heat the blood paſſing through it; but either of theſe opinions eaſily fails, from which it is clear, that the Heart is a mere Muſcle, nor doth

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contain in it ſelf any tinder or matter for a flame or heat (I know not how) implanted, fit for their continuance. For though it be confeſſed, that on the continual motion of this Bowel, (which is only animal) the Circulation of the Blood doth depend, yet the Heart borrows heat altogether from the blood, and not the blood from the Heart.

Secondly, As to what reſpects the ſecond way of making hot a liquid thing, to wit, whereby a great heat is excited by the mixing of ſaline Corroſives together, or alſo oily, or by corroding a metallick Body, I think there is none that will ſeriouſly aſſert, that the blood grows hot from ſuch a cauſe; for that its liquor, in its natural ſtate, is always homogene, and although it be ſtuffed with plenty of Salt, it is however with that which is volatile, gentle, and benign only: But there is not to be found, either in the Heart, or in any other place a ſaline or any otherwiſe heterogene Mine, whereby the bloody liquor, by working or corroding, may get or conceive an heat: to wit, it behoves either ſuch a Mine or the Body to be corroded, to be perpetually renewed, becauſe the ebullition and heat raiſed up by the ſtrife of Salts, ceaſes as ſoon as the Salts are combined, or the Body corroded. If at any time the ſaline Particles of the humours in our Body depart from their right temper, and become enormous and unbridled, for that reaſon the blood, as to heat and motion, enters into ſome irregularities; yet it ſeems impoſſible, that it ſhould originally and perpetually become hot by the congreſſion, and ſtrife, or corroſion of the Salts.

Thirdly, As to the third way, whereby Liquids are made hot, though it may ſeem an uncouth ſaying, That the blood is ſo inkindled, yet ſince we cannot attribute it to any other way beſides, what ſhould hinder from attributing its heat to this Cauſe? And the rather, for that the proper paſſions of Fire and Flame are agreeable to the life of the Blood alone.

For indeed theſe three things are chiefly and principally Eſſentials, requiſite for the perpetuating flame. Firſt, that there be granted to it, aſſoon as it is inkindled, a free and continued acceſſion of the Air. Secondly, that it may enjoy a conſtant ſulphureous food. Thirdly, that its recrements both ſooty, as alſo the more thick, be always ſent away. So then if I ſhall ſhew theſe things to agree after the ſame manner with life, as flame, and to thoſe only, without doubt, I think that life it ſelf may be eſteemed a certain kind of Flame.

In the firſt place therefore, that a flame may be inkindled, and remain inkindled, there is need of a free and undiſcontinued acceſs of Air, and that not only, that the vaporous Effluvia's, threatning the ſuffocation of the flame, may be carried away, and always depart, but much rather, that the nitrous food neceſſarily requiſite for the burning of any thing, may be ſupplied by the Air. For indeed every ſublunary fire, and eſpecially flame, is compounded or made up altogether of ſulphureous Particles, breaking out in heaps from a combuſtible Body, and of nitrous Bodies, which every where flow in the Air, meeting with them: when Particles of Sulphur, breaking out ſlowly or interruptedly, get to themſelves a few nitrous, only planted near them, a fire is uſually produced, ſuch as is ſeen in a burning Coal: But when the former going away more impetuouſly, either of their own accord, or forced by blowing, preſently lay hold on very many nitrous Particles flowing round about in the whole circuit, a flame ariſes. In truth the whole region of the Air is abundantly ſtuffed with nitrous little bodies, which are every where ready for the conſtituting of fire and flame, and they being any where inkindled, meet them after the manner of a flood, although not always after the like manner or meaſure, becauſe it is obſerved at ſome times, eſpecially in the Winter-cold, when the Air abounds more in Nitre, that fire or flame doth more ardently burn, and diffuſe farther its heat: on the contrary, in rainy weather, as alſo when the beams of the Sun ſhine upon the fire, and ſo diſſipate the Nitre of the neighbouring Air, the fire is ſo dull'd, as is commonly ſaid, that it is extinguiſhed by the Sun. If at any time the nitrous Particles of the Air are excluded from the ſulphureous of any ſubject breaking out in the inkindling or burning, the fire and flame quickly periſh; which appears, becauſe this or that being put into a Glaſs, after the Air is ſucked out or excluded, they preſently expire. Further, in the open Air, although a naked fire propagates a fire in a fireable matter by mere contact, yet a flame is hardly inkindled without a flame be put to it, or a very ſtrong fire: becauſe, for the ſtirring up of a flame very many nitrous Particles of the Air, implanted round about, ought to be inkindled at once; as if Nitre and common Sulphur being pound-

ed together, be commixed (becauſe both Incentives agree) even the leaſt ſpark falling into ſuch a mixture begets an highly impetuous flame, which deſiring no farther a nitrous food, is inkindled or burns under water, in a place void of air, or in any place as freely as in the open air. In like manner the leaſt ſulphureous things, as a bit of ponderous wood, being caſt into a red-hot Crucible, in which Nitre is fuſed, the ſame at firſt touch preſently conceive a flame, and continue till it be wholly conſumed: But that fire and flame being included in a place empty of air, expire by reaſon of the food of Nitre being drawn away, rather than choaked by their own proper ſmoke, the Illuſtrious Mr. *Robert Boyle* hath moſt clearly demonſtrated by very many Experiments. For a Candle being lighted, and put into a capacious globe of Glaſs, and the Veſſel ſtopped up: aſſoon as the air was ſucked out by a wind-inſtrument, the flame did expire. Moreover he obſerved, what concludes for our Hypotheſis, that the flame contracted it ſelf according to all its dimenſions, aſſoon as ever the Engine began to ſuck, then after the ſecond or third draught of the drawn forth air, the flame about the utmoſt extremities appeared very blue, and to go back more and more from the Tallow, till at length getting to the top of the ſnuff it expired: the ſame Candle being again lighted, and ſhut up in the recipient, this worthy Gentleman tryed how long it was able to ſuſtain its light, when the air was not exhauſted, and he found it to endure much longer lighted than before. From theſe it clearly appears, that the flame ſhut up, expires not ſo much becauſe it is ſuffocated by its own proper ſmoke, as becauſe it is deſtitute of the nitrous food of the Air. For in the former Experiment the air being exhauſted, there was more ſpace for the ſmoke and fume, that the flame might not be ſtifled, and yet this dyed ſooner, the Recipient being empty, than the ſame being full of air; beſides, the flame dying became bluiſh, for as much as it participated of more Sulphur than Nitre; and it left the Tallow, and expired at the top of the ſnuff, for that it followed its moſt neceſſary food as far as it was able, to wit, the nitrous Particles of Air. The ſame Experiment ſucceeded alike in live Coals, *viz.* the naked fire, after the food of Nitre was drawn away, ſuddenly dyed. Here alſo it doth what the flame of a Candle doth in Mines or Caves under ground, where the nitrous air is wanting or diſpelled, at firſt it becomes more contracted and blue, and then a little after expires.

Exper. Phyſ. Mec. 50.

Exper. 13.

Exper. 78.

I have been more large in this Argument, becauſe there is for both the like neceſſity of drawing in of the air, after the ſame manner, for the ſuſtaining the life of the Blood, and for the continuing of flame. For the more hot Animals, if they are hindred from reſpiration dye quickly, wherefore the ſame means of killing is moſt ready and common to ſhut up the breath, which being wholly obſtructed, life periſhes as a flame. If it ſhould be objected, that thoſe choaked do dye, becauſe the ſoot or ſmoke being retained, blow up and intumifie the bloody maſs, which for that reaſon, the bulk or ſubſtance being increaſed, and made almoſt immoveable, fills the boſom of the Heart, and hinders its motion: I ſay, that this is improbable, becauſe if the Arteries, every where in the Limbs and about the Neck, be ſtrained hard together with Ligatures, that the blood being ſtraitned as to the compaſs of its circuit, be very much ſtopped about the Præcordia, (more certainly than can happen from the mere retained ſmoke) yet for that cauſe death neither preſently follows, nor any deadly Symptoms. That this happens in thoſe that are hindred from reſpiration, becauſe the vital flame of the blood is wanting of the nitrous food of the Air, rather than overthrown by its proper ſoot or ſmoke being detained, the moſt Famous *Boyl* alſo by his Experiments hath put it out of doubt; for he hath obſerved, that hot living Creatures being put within a glaſſy Globe, and ſhut up, did far ſooner expire, the air being drawn away from them, than the ſame being left within it, though in the former caſe, there was more ſpace left for the receiving the ſmoke, leſt the retaining of it might conſtipate the blood: yet however, if the heat of the blood ſhould ariſe from Fermentation, or the congreſſion of diſſimilar Particles, or from an ebullition, by reaſon of admitted heat, or from any other cauſe beſides accenſion, it is ſo far that that effect could be inhibited or ſuppreſſed by reaſon of the air being excluded, that on the contrary it would rather for that cauſe become more ſtrong or intenſe. For it appears, by a common obſervation, that Liquors chiefly fermentable, the more ſtrictly they are kept in the Veſſel, the more they grow hot, and the air being admitted through ſome vent-hole, they preſently ceaſe from their fury. Moreover, Mr. *Boyl*'s Experiments clearly ſhew, that the effervеſcencies or growing fervent, ſtirred up by the ebullition of unlike Particles, or by corroſion, alſo the boiling up of

Exper. 41.

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hot water in a glaſſie Sphere, are above meaſure increaſed after the air is ſucked out, *Experiment. Phyſicom.* 41, 42, 43. That moſt ingenious Tract of the aforeſaid Author ſupplies us with many Experiments, whereby it is abundantly manifeſt, that the inteſtine motions of thoſe Particles, and almoſt of every thing, beſides fire and life, are very much heightned or made ſtrong in the ſpace emptied of air; but their act, preſently after the air is withdrawn, is extinguiſhed: hence we may conclude, the life of a living Creature to be either fire, or ſomething analogical to it. The like to theſe is yet more clearly obſerved by the diggers of Minerals, who ordinarily experiment in ſubterranean Caves, where either the Nitre is wanting, or is driven away by ſome ſtrange damp or vapour, ſo that they are in danger of being ſtifled or ſmothered, at the ſame time the flame of the Candle is diminiſhed, becomes blue, and at length expires.

The ſecond thing requiſite to ſuſtain a flame, is a conſtant ſupply of ſulphureous food, whereby it may continually be fed, which being ſubſtracted, or by reaſon of ſome incongruous mixture depraved, the flame is extinguiſhed; as is perceived in a Lamp, which for want of oyl, or water poured in its place, expires: further, as this ſulphureous food is more or leſs ſuggeſted, ſometimes more plentifully, ſometimes more ſparingly, the flame being more or leſs intenſe, is ſometimes produced clear, ſometimes ſmoaky; in the mean time, the food being conſtantly conſumed by burning, goes away partly into vaporous Effluvia's, and partly into aſhes, which are made up of ſome Particles of Earth, Salt, and Sulphur: But it is much otherwiſe in Liquors expoſed to Fermentation, to which if new Particles be continually adminiſtred, and the old ones depart, the Fermentation is hindred or diſturbed.

In like manner, as in Flame, the Blood of the hotter Animals (and this only in all natural things, beſides fire) requires a conſtant and copious ſulphureous food; and that being quickly worn, is for the moſt part conſumed in vaporous Effluvia's, a *Caput mortuum* being left of Earth, Salt, and ſtinking Sulphur: In the mean time from its food conſumed by burning, it diſpoſes other Particles for other uſes. That the life or flame of the blood doth continually want aliment, there is none but daily finds it in himſelf: For if that be for ſome time denied, the vigor of the blood is diminiſhed, yea and conſuming the ſolid parts, it ſnatches into its boſom their remnants, and other humours of the Body whereby it may be fed. If the nutriment daily ſuggeſted from things taken, be too thin and watry, the fervour of the blood, like flame without food, uſes to be remitted; but if the food be very ſulphureous and ſwelling with a vinous Spirit, and plentifully taken in, the blood is preſently inflamed, and often breaks out into a Feaver, as it were an open burning. In the interim out of that food of the blood exhauſted or conſumed, as it ſeems by accenſion, hot Effluvia's full of ſoot and vapour go away, which according to a juſt account, far exceed all the other excrements of the Body; and that their nature is plainly fiery, the frequent burning of the mouth and tongue, and infecting them with blackneſs like the ſoot or ſmoke of a Chimney, witneſſes; beſides, from the inflamed blood aduſt Feces, like a *Caput mortuum*, are ſent into the Bladder of the Gall, Spleen, and perhaps into other Emunctories.

Thirdly, That inkindled Flame may for ſome time continue, there is need of continual ventilation, to wit, that its ſooty Effluvia's may ſtill fly away, which elſe being detained and heaped together thereabouts, will ſuffocate the fire, becauſe by obſtructing the Pores of the inflamed Body, they hinder the eruption of the ſulphureous matter to be inflamed. Although this condition doth often interfere with the other more potent, *viz.* the neceſſity of nitrous food to be ſo drawn in from the air, that it can ſcarce be diſtinguiſhed from it; yet we may plainly perceive, from the detained ſoot gathered together about the ſnuff, the light to be put out: for which cauſe a Lamp, whoſe wick is made of plumous Alum or other incombuſtible matter, will not (as it promiſes) endure any long time, becauſe the ſoot ſticking to the wick, hinders the acceſs of the oyl to the flame; for this reaſon blaſts of wind from the Air wiping away the ſootineſs, doth not only render the flame more clear, that is free from fume and thick vapour; but food being ſufficiently given to it, it becomes more durable.

Even as Flame, the life of the Blood requires alſo continual ventilation; to which end, beſides the greater breathing places of the Breaſt, innumerable leſſer, *viz.* the Pores of the skin gaping every where through the whole Body, do ſend forth Effluvia's departing plentifully from the boiling blood; which if it happens to be hindred,

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or too closely shut up, the blood will grow excessively hot, being as it were beset with fume and vapour: besides, there is need to shorten its circuit, that passing through the Lungs with a more frequent turn, it might there, as much as it can, dispel all its soot or smoak. When the Heavens are heated, the Air seems as it were immoveable and to stagnate, we are wont very much to estuate or grow hot about the Præcordia; for that the blood being fed with a more sparing nitrous food, doth not burn so clearly, but glows with a more suffocating and intrinsick burning: further, for that the Particles of the Air being less nimble, when they are inspired and expired or breathed forth, do not so readily convey away the vaporous Effluvia's of the blood; hence it is, that we fan the Air, that it may be made more moveable, and carry away more quickly and plentifully the soot or smoke from our Præcordia.

There yet remain some other smaller Considerations of Fire and Flame, respecting indeed not so much the Essence, as the production and extinction of either, which, whether and how far they may agree with the life of the Blood, we shall briefly inquire into.

Fire or Flame is produced two ways, *viz.* either it is kindled from another fire or flame, or begot by an intestine motion of sulphureous Particles. We have largely shewed the Species of either, and the manner of their being made, in our Tract of Fermentation (only we omitted there, that the accession of nitrous food was necessary for the sustaining it) even as flame, the life also of the hot or warm Blood, we have observed to be produced by a twofold way, to wit, it is either inkindled from another life or soul, as in Creatures that bring forth alive; or intrinsical Particles predisposed to animation, are at length raised up to life with the blood by a long cherishing of external heat, as in oviparous or egg-laying Creatures.

If it be further demanded, when and how the vital Flame is kindled first in the Blood? I say, some small beginnings of it are laid up from the conception it self in the Genital humour, to wit, when the rudiment of the bodily Soul culled out from the Souls of the Parents, as a little spark stricken from those flames, is hid in a convenient matter; which being from thence raised up by the Mothers heat, begins a little to glow and shine, and afterwards being daily dilated with the blood brought forth, and leisurely increased, is equally extended with the Body, which it actuates and animates. But yet as long as the young one is included in the Egg or Womb, the vital fire, getting very little or scarce any aery food, doth not yet break out into open flame, but like a Brands end covered over with ashes, burns only slowly and very little, and spreads abroad scarce any heat; wherefore both the formation and increase of the Embryo depends very much on the Mothers heat, or the cherishment of some other analogical thing, whereof being destitute it perishes: but as soon as the young one is born in due time, and begins to breathe, the vital fire presently receiving the nitrous food, largely unfolds it self, and an heat or effervescency being raised up through the whole bloody mass, it inkindles a certain flame; and because the blood then first rushing into the Lungs, having there gotten an accession of Air, begins to burn, the flesh of that Bowel, at first reddish, is shortly changed into a whitish colour, like burnt ashes, and the blood it self undergoes a notable alteration; for what did flow of a dark Purple colour into the Pneumonick Vessels from the right side of the Heart, returning from thence presently out of the Lungs, becomes Crimson, and as it were of a flame-colour, and so shining, passes through the left Ventricle of the Heart and the appending Arteries.

Indeed that in Creatures new-born, the colour of the Lungs is so suddenly changed, I think it ought to be attributed to the blood, there at first more openly inkindled, and their flesh as it were somewhat roasted; although the mere inflation of the Lungs in a dead Embryo produces the like effect, because the Membranes of the Lungs and the Parenchyma being distended and increased into a greater capacity, shake off the stagnating blood, and so draw it away into little and scarce to be discerned rivulets.

As to the Colour of the Blood, so variously changed into circulating from a dark purple to a crimson, and from this to that, I say, that the immediate cause of this is, the admixtion of the nitrous Air with the Blood; which certainly appears, because the change into a crimson, begins in that place where the blood chiefly gets the access of the Air, *viz.* whilst it is transferred out of the Arteries into the Pneumonick Veins; for in those it appears of a dark Purple, in these every where florid, as the most Learned Doctor *Lower* hath observed. Further, it yet farther appears, that

that this alteration of the colour proceeds from the admixture of the Air, becauſe that crimſon colour follows in the ſuperficies of all blood, let out of the Veſſels by reaſon of its meeting or mingling with air; and if the flowering or top be taken away, another preſently ariſes. Beſides, the blood being let out of a Vein, and very much ſtruck with a ſwitch or rod, it becomes crimſon through all: and in like manner the blood of living Creatures ſhines at firſt within the Pneumonick Veins, to wit, preſently after the influx of the air by the Wind-pipe; and from thence, by reaſon of the ſame Particles of inkindled air being yet retained, it paſſes through all the Arteries ſtill florid; in the mean time, from the Nitre of the Air mingled with the ſulphureous Particles, and burning with them, the blood being greatly rarified, and in truth expanded into flame, impetuouſly ſwells up within all the paſſages of the Pneumonick Vein and the great Artery, ſending from it ſelf copious breaths and hot Effluvia's; but being dilated towards the ends of the Arteries, and returning towards the Heart, that it may enter more cloſely into the little mouths of the Veins, it lays aſide its turgid and burning aery Particles, and being preſently made more quiet and half extinct, and ſo both its vigour and alſo its colour being changed, it returns through the paſſages of the Veins, that at length running into the Lungs, it might renew its burning. After this manner, that the inkindled blood might flame through the whole Body with a perpetual and equal flame, and ſucceſſively renew its burning in all its Particles, it ought to be carried about by a perpetual courſe from the neſt of its accenſion into all parts, and from theſe to that. For this end the Machine or Engine of the Heart was needful, as a Pin or Cock, which being made with a double boſom, might receive in it ſelf from the whole Lungs the blood freſh inkindled, that it might preſently drive forward, whilſt burning, into every part of the whole Body, and might then receive the burnt and half extinguiſhed blood returning from the whole Body; which being imbued with new inflammable juyce, it might deliver to the Lungs to be re-inkindled.

In performing this task, although the Heart be a mere Muſcle, and exerciſed only with an animal motion, ſeems to ſerve alone for the Circulation of the Blood; yet in the mean time, it ſo much helps to moderate the accenſion of the blood and its burning, according to the rage of the paſſions, and to direct other works and uſes of the animated Body, that we have thought the vital or flamy part of the Soul to have its chief, and as it were Imperial ſeat in the Heart and Lungs, in every diſtemper or affection, as of Grief, Joy, Fear, and the like; alſo in the fits of Diſeaſes, the Heart is diſpoſed after a various manner, and hence it comes to paſs, that the blood flowing in fluctuates, and is inkindled with a diverſe rage; of which there will be a more opportune place of diſcourſing, when we ſhall treat of the Paſſions.

Whilſt we conſider that the burning of the Blood, and for that reaſon the vital or flamy part of the Corporeal Soul doth not appear lively or vigorous in all, nor ever after the ſame manner or meaſure; yet it exiſts according to the various conſtitutions of the blood, to wit, as it is more or leſs ſulphureous, ſpirituous, ſaltiſh, or watry, yea and according to the divers conſtitutions and conformations both of the food, with which this flame is nouriſhed, as alſo of the little ſpiracles or breathing holes, by which it is eventilated; and further, of the Heart it ſelf, whereby it is agitated and driven about here and there; the accenſion of blood varies alſo in every one, by means of ſeveral other accidents, to wit, as its flame is ſometimes great, clear, and expanded, ſometimes ſmall, contracted, or cloudy, ſometimes equal and in order, ſometimes unequal and often interrupted, yea and it becomes ſubject to many other mutations; alſo becauſe the Soul it ſelf having gotten a various nature or diſpoſition, it conceives divers affections and manners, whereof we ſhall ſpeak hereafter; for as much as it is not a little thing, that the diſpoſition of the whole Soul depends upon the temperament of the bloody maſs, and the degree and manner of its accenſion or inkindling.

It clearly appears, from what hath been ſaid, that Fire and Life do dye or are extinguiſhed alike many ways, to wit, there is an end of either, if the acceſs of nitrous food, or the departure of Effluvia's be hindred, or if the oily or ſulphureous aliment, requiſite to either, be conſumed, too much withdrawn, or perverted from its inflammable diſpoſition; of each whereof it is ſo clearly apparent, that there needs no farther explication.

Thus far we have ſhewn, that the Life of the Blood, or that part of the Soul growing therein, is a certain kind of Flame; let us now ſee by what means it is diſpoſed

to burning, and how near it comes to the ſimilitude of a burning Candle or Lamp.

A common Lamp, whether deſigned to give heat or light, for the moſt part is wont to be made after this manner; to wit, the Oyl flowing perpetually to the wick, gives continual food to the flame; wherefore as there is but one fire-place or hearth only of light and heat, the action of either is limited only to one place, and ſo as often as there is need of more places at once, or divers parts of the ſame ſpace or body to be illuminated or made warm, we place here and there divers lighted Candles or Lamps. But if an Inſtrument made with great artifice (ſuch as is truly an animated Body) with one liquor only contained in it, ſhould be made hot throughout the whole, and to be kept always warm, it ought not only to be lightly inkindled in the wick, but in the whole ſuperficies, and derived by fit Tubes or Pipes to all the parts of the Machine, then the burning liquor ought to enjoy, proportionably to all its parts, an acceſs of nitrous Air, and to lay aſide Effluvia's and other recrements, and ought alſo to have a ſupply of that conſtant expence: theſe kind of offices are not to be performed any where up and down, but only in ſome ſet places; therefore the burning liquor ought to be carried about through the whole with a perpetual turn, that all its portions might enjoy ſucceſſively all thoſe priviledges, and at once heat the whole capacity of the containing Machine, to wit, both the inward and outward receſſes. Indeed ſuch a Bannian or Bathing Engine, artificially made, might aptly repreſent the real Divine handy-work of the Circulation of Blood, and what burns in it, the Life-lamp.

But it may be objected, that the Blood ſeems not to be inflammable of its own nature; further, ſince there is no flame of this heat or effervency to be beheld with the eyes, it may well be doubted, whether there be ſuch a thing or no. I ſay firſt, That the Chymical Analyſis of the blood ſhews very many particles of Sulphur and of Spirit, yea a plentiful ſtock of inflammable Oyl, which are however mixed with other more thick Elements, in a juſt proportion, to bridle their too great inkindling; to wit, that this liquor might flame out by little and little, and only through fewer parts, for the conſtituting of a benign and gentle Lamp of life: wherefore the blood being let out of a Vein upon a burning fire, doth in ſome meaſure burn, though it is not like the Spirits of Wine, or Oyl of Turpentine turning all into a flame; beſides, the whole maſs of blood, as the Oyl of a Lamp, ought not to be fired; yea its burning is inſtituted for that end, that whilſt all the Particles of the Mixture being freed, ſome ſulphureous and ſpirituous are conſumed by burning, others more ſubtil being ſent in Troops, might ſerve for the neceſſary uſes of the animal Regiment; and alſo others more thick or craſs and nouriſhing, as it were boiled or roaſted, might be diſpenſed for the cheriſhing all parts; beſides, that all the dead, or worn out, and excrementitious may be ſent away by fit or convenient ſinks, and others conſtantly ſubſtituted in their places by nouriſhment.

But in the interim, that the vital Flame, which deſtinated to ſo many offices, we ſuppoſe to be inkindled in the Blood, (otherwiſe than the common flame, which is plainly conſpicuous) appears not at all, a probable reaſon thereof may be given; as it is moſt thin, and burns in the Heart, and its depending Veſſels as it were ſhut up in Receptacles, it doth not clearly flame out, but perhaps remains in the form of ſmoke, or a vapour, or breath; yea, although the blood ſhould openly flame out, yet it might be ſo done, that its ſhining being moſt thin, may not be perceived by our ſight, as in the clear light of the day we cannot behold a glowing red-hot Iron, nor ſhining ſparks, nor falſe fires, nor rotten wood, nor many other things ſhining by night; why then may not the vital fire, even thinner than they, quite eſcape our ſight? Although ſometimes hot living Creatures uſe to ſend forth a certain fire or flame only conſpicuous by night: For we have known in ſome endued with a hot and vaporous blood, when they have put off their inner garments at night going to bed near a fire or Candle, a very thin and ſhining flame to have ſhewn it ſelf, which hath poſſeſſed the whole inferiour region of the Body. The reaſon of which affection ſeems wholly the ſame, as when the evaporating fume of a Torch juſt put out is again inflamed by a light inkindling, and manifeſtly argues that another flame, the root of this extrinſick one, lyes hid within the Body. For this very cauſe it is, that from the Mains of Horſes, and the Skins of Cats, or other hot Animals being ſhaken, little ſparks as it were of fire leap out, and often flames, only conſpicuous in the dark, ariſe. Beſides, we here take notice in a burning Feaver, cauſed by immoderate drinking of Wine or ſtrong Waters, that the blood, as the flame of it is very much increaſed,

increaſed, doth grow exceſſively hot, and ſuch are wont to emit dry breaths, and ſharp Effluvia's of heat, not like thoſe that proceed from fermenting or boiling Liquor, but only inflamed. That which ſome in Feavers have imagined to have ſeen or obſerved even burning fires and flame in the eyes, argues indeed that the flame of the blood is very ſtrong, and alſo that it penetrates the incloſure of the Brain. I knew a certain ingenious Man of a very hot brain, who affirmed, that after a very plentiful drinking of Wine, he was able in the darkeſt night to read clearly; from hence alſo may be collected, how the accenſion of the blood, like that of burning Liquors, is to be increaſed or made ſtronger, *viz.* by an agitation of the parts, and a more plentiful affuſion of ſulphureous food.

But that in the hot blood of living Creatures, the Properties, Affections, and many other accidents of Fire or Flame are found without the manifeſt form or ſpecies of it; what if we ſhould ſay the cauſe to be, for that the vital flame of the blood is ſubjugated, or made ſubordinate to another form, *viz.* to the corporeal Soul? Wherefore, although it retains the chief qualities and affections of common flame, yet it loſes the ſpecies of flame or fire; for in every natural mixture, the ſuperiour form exerciſes a Right and Dominion over all included Particles whatſoever, however fierce and untameable they may be in themſelves, and ſtripping them of their ſpecies, ordains and diſpoſes them to peculiar actions in that proper Concrete: when the form of fire excels, that bright burning, that it might propagate largely its ends, deſtroys and conſumes all inflammable objects. But if the form of the corporeal Soul be induced upon the fire, kindled within the blood, it burns forth without fulgor or ſhining, or deſtruction of the ſubject, and is inviſible, and as it were ſubjugated flame, is ordained for the ſuſtaining of life and its offices: but truly the Divine Providence, from the very Creation of the World, hath ſeemed to have predeſtinated Forms to natural Bodies, to wit, that they might remain as ſo many Figures or Types, according to which every portion of matter framing the Concrete, whether animate or inanimate, might be modificated; ſo that the Maſs, according to the virtues of the hidden Seeds, being diſpoſed after this or that manner, happens to have the form of a Stone, a Plant, or Brute, or of any other kind; then the acts and affections, appropriate to ſuch a Species, follow the form it ſelf. When therefore Life or Soul is deſtinated to theſe kind of Functions of the more perfect Animals, for the performing of which, the blood, after the manner of burning Liquors, ought to be perpetually hot, and as it were inkindled; what ſhould hinder, but that the act of Life, or of that corporeal Soul (conſiſting in the motion and agglomeration or heaping together of moſt ſubtil and agil Particles) may be called a certain Burning or perpetual Fire of the bloody Maſs? Wherein although the accidents and chief qualities of common fire are implanted, yet the form of fire is obſcured, as being ſubjugated to a more noble form, *viz.* of the corporeal Soul: not much unlike water, which being congealed into Ice or Snow, lays aſide the ſpecies of water for a time, and may be applied to other uſes far diſtant from fluidity.

But truly, though we affirm, that the corporeal Soul doth ſtick in the Blood, yet we do not, that it is adequated or limited to it: becauſe whilſt the more thick portion of it, as the Roots of ſome Tree, fixed in the Earth, are ſowed in the bloody Maſs, the more noble part of the ſame Soul, as the higher branches, are expanded in the Brain and nervous Syſtem; or as we before hinted, when the vital or flamy part of the Soul is contained in the blood, the animal or lucid portion of it is contained in the Head and its Appendix; by which juſt limit the Sphere of either may be defined, neither may the vital flame impetuouſly break through the animal Region, the ſubſtance of the Brain being more cold, and alſo ſhining or bright, is oppoſed to it, as it were an icy or glaſſie Bar, whoſe interiour frame or ſubſtance, the ſmall and ſlender as it were rivers of the blood, for the ſake of cheriſhing heat, can enter: but truly ſpirituous Particles plentifully flow from its juyce or liquor, every where heaped up near the confines of the Brain, and there diſpoſed as it were to be ſtilled forth, which being immerſed in the Brain, and more exalted, affords matter, out of which the animal Spirits are procreated, to be derived through the Nerves into the various Regions of the Body.

The ſecond Medical and Phyſical

DISCOURSE.

Of Muſculary Motion.

AS there are two chief or primary Faculties of the Corporeal Soul, to wit, the Senſitive and Motive, we have aſſigned certain exteriour Powers of either of them, which are chiefly acted in the Nervous ſtock, and others interiour, the Exerciſes of which lye within the Brain, to wit, ſuch as the Imagination, Memory, Appetite, &c. What we have publickly diſcourſed of ſome time ſince both concerning internal and external Senſes, may perhaps hereafter be brought to light and made publick: in the mean time, becauſe I am oppoſed, concerning both the natural and convulſive Motion, I think it fit at preſent to publiſh what I had meditated touching the Motive power, and what Hypotheſis I had conceived of ſo hard and highly intricate a thing.

The motive Faculty of the bodily Soul is wont to be exerciſed with another kind of Action than the ſenſitive, *viz.* with a diverſe aſpect and tendency of animal Spirits. For that every Senſe is a certain paſſion, wherein the Soul, or ſome portion of it, being outwardly ſtruck, is forced to nod or ſhake, and a wavering of the Spirits being inwardly made to look back towards the Head; but on the contrary, every Motion is a certain Action wherein the Soul ſeems to exert it ſelf whole, or part of it ſelf, and by a declination or fluctuation of Spirits being made to bring forth a Syſtaſis, and to extend ſomething as it were its member. Further, whilſt the Soul ſo exerts it ſelf, or ſome part of it ſelf, that the works then deſigned might be performed, an heap of animal Spirits being every where diſpoſed in the motive parts, ſometimes one, ſometimes more are raiſed up by the Soul, which by that means being expanded with a certain force, and as it were exploded, they blow up the containing bodies, and ſo the ſame being increaſed as to their thickneſs, and made ſhort as to their length, are made to attract the adjoyning member, and ſtir up local motion.

1. In every motion, theſe three things ought to be conſidered: *viz.* Firſt, the original of the Action, or the firſt deſignation of the Motion to be performed, which is always in the Brain or Cerebel. Secondly, its inſtinct or tranſmiſſion of the thing begun to the motive parts, which is performed by the commerce of the Spirits lying within the Nerves. Thirdly, the motive force it ſelf, or exertion of the Spirits implanted in the moving parts, either into a contractive or elaſtick force. From this threefold Fountain, *viz.* as the buſineſs is performed in every one of theſe in a various manner, very many kinds and differences of Motions are deduced.

1. As to the original or beginning of Motion, we ſhall take notice, that that which proceeds from the Brain, with a knowing and auſpicious appetite, may be called Spontaneous or Voluntary; but that which is wont to be excited from the Cerebel, where the Law of Nature preſides, ſuch as are Reſpiration, the Pulſe, with many others, may be called merely Natural, or Involuntary: either of theſe is either direct, which is ſtirred up of it ſelf, or primarily from this or that beginning, as often as the appetite requires this or that thing, out of a certain proper, and as I may ſay, inteſtine deliberation, and chuſes out reſpective motions; ſo in like manner, when the ordinary offices of the natural and vital Function are performed, according to the ſolemn Rite of Nature; or the motion of either kind is reflected, to wit, which depending on a previous ſenſe more immediately, as an evident cauſe or occaſion, is preſently retorted; ſo a gentle titillation of the Skin cauſes a rubbing of it, and the more intenſe heats of the Præcordia ſtir up the Pulſe and Reſpiration.

2. As to the Vehicle of the Inſtinct, which we ſuppoſe to be wholly done by the Nerves, for as much as it is performed by a ſingle Nerve, or by more at once, it is called either a Simple or Complicate Motion; then for that ſome Nerves help motion more or leſs than others by ſooner or later moving, this or that member is ſaid to be moved firſt, or by it ſelf, and another by conſent: yea, and that conſent is wont

wont to be acted or done with neighbouring or more remote parts, and that with a diverſe reſpect: But we have in another place largely ſhewn inſtances of theſe kind of ſympathetick motions, as alſo the cauſes of each of them, and their manner of being made.

3. There is another, and that a remarkable diſtinction of Motions, taken from the various conſtitution of the moving parts: to wit, parts endued with nervous Fibres, and in which the motive Spirits dwell; either they are Muſcles, which perform local motions; or membranaceous bodies, the motions of which are terminated in themſelves, which therefore we call Inteſtine. As to what belongs to local motion, of which only we treat at preſent, although it be confeſſed by all, that the Brain or Cerebel, and the Nerves and Muſcles together one or more, as it were with joynt forces, do contribute to this motion; alſo, though it may be ſufficiently underſtood, that the beginning of the motion to be performed is deſigned in the Brain or Cerebel, and that its inſtinct is conveyed wholly by the Nerves; yet by what means the Muſcles perform that work, far exceeding any mechanick virtue or operation, ſeems moſt hard to be made plain.

That local Motion is performed by traction, and doth depend upon the contraction of a Muſcle, is not only a vulgar Opinion, but is alſo plain by ocular demonſtration; yet it is very much diſputed and variouſly controverted among Authors concerning the manner of Contraction and efficient Cauſe; ſome think it enough to ſay, that the Soul it ſelf, by its preſence, doth actuate the Muſcle, or contract or draw out here and there its Fibres, as it were a net ſpread forth. But indeed this is to attribute to the ſenſitive Soul a ſupernatural, and as it were Divine virtue. To wit, that the ſame, by its mere Spirit, was able to bend and force heavy and very great bodies whither it pleaſes. Further, for what end are the motive Organs framed with wonderful artifice and manifold difference, unleſs that after the manner of Machines, they might perform their operations by an orderly ſtructure, and as it were mechanical proviſion of parts? Truly it will be no hard thing to apply the exerciſes of a Muſcle and of the whole nervous Function, and to explicate them according to the Rules, Canons, and Laws of a Mechanick. Before I enter upon this, I think it not amiſs firſt to ſpeak ſomething of the make, conformation, and uſe of a Muſcle in general. The ancient Anatomiſts, almoſt all with one conſent, did divide the body of a Muſcle into Head, Belly, and Tail; taking for the Head the extremity of the Muſcle connexed to the part, to which contraction is made; for the Tail, the end or portion of the Muſcle inſerted to the part to be moved; for the Belly, the part of the Muſcle coming between, which is beheld more tumid, with a bulk of fleſh; then for the performing of motion, they did ſuppoſe the Muſcle to ſwell up about the Head and Belly, and ſo to grow ſhort as to its length, and to attract nearer to it ſelf the hanging part; yet by what means, and for what cauſe the belly of the Muſcle ſwells up, none yet hath clearly unfolded.

Moreover, although the Doctrine of the Nerves hath been much deſcribed by the moſt skilful Anatomiſts of every Age, ſo that the Muſcles of the whole Body (as it is thought) have been exactly recounted, and offices aſſigned them, and monſtrous names fitted for the expreſſing them, yet the true frame of a Muſcle, not yet ſhewed by others, firſt began to be delivered lately by the moſt ingenious Doctor *Steno*. He hath found out in every Muſcle two oppoſite Tendons, into which both the Fibres go; yea, and hath taught, that the ſame Fibres wholly, which compoſe ſtrictly on one ſide, the Tendon of the knitting being more looſly joyned, do conſtitute the fleſh; yet ſo, that ſome being laid upon others, compoſe the thickneſs or profundity of the Muſcle, and ſome laid nigh to others, its breadth or latitude: he calls the former Fibres *Ordines* or Orders, but the other *Verſus* or Turnings; then the parts and compoſition of a Muſcle being after this manner laid open, he aptly reduces its Figure to Mathematical Rules, and according to Canons thence taken, ſhews the action to be unfolded: becauſe he advertiſing, that in a Muſcle with a ſimple right line, all the fleſhy Fibres, parallel within themſelves, and for the moſt part equal, are carried from one Tendon obliquely into another; and that thoſe Tendons are ſowed in the oppoſite ends or angles of the fleſh, whereby he moſt ingeniouſly deſcribes a Muſcle to be, *a Collection of moving Fibres, ſo framed together, that the middle fleſh conſtitute an oblique angular Parallelopipedum, but the oppoſite Tendons compoſe two quadrangular Priſms or Figures.* The Inſtrument which Painters uſe for the deſcribing many Examples of the ſame thing, fitly repreſents the figure of this delineated in a plain: becauſe the

the ſtyles being fixed to the oppoſite Angles, expreſs the inſertions of the Tendons and the Parallelogram it ſelf the fleſhy part of the Muſcle: for when the oppoſite Angles are diduced to a great diſtance from one another, and made ſharper, the two ſides come nearer together, and render the *Area* or middle of the Figure longer, but narrower, a Muſcle not contracted is denoted: But if the ſame Angles are brought nearer, and made more obtuſe, the two ſides go farther apart, and ſo make the middle of the Muſcle ſhorter, but alſo wider, a contracted Muſcle ſeems to be repreſented. In the mean time, in either ſite of the aforeſaid Parallelogram the quantity or longitude of the ſides is not changed, but only their poſition, (and the largeneſs of the Angles is varied: whether it may be alſo ſo in a Muſcle, ſhall hereafter appear. In the mean time we ſhall take notice, out of the obſervation of the ſame moſt Learned *Steno*, that a Muſcle is either ſimple, which conſiſts of one belly and two Tendons, of which ſort there are many in the Arm and Leg, which are the movers of the fingers and toes, yea and almoſt every where in other parts of the Body; or compounded, that hath many bellies, to every one of which, two oppoſite Tendons are hung; yet ſo, as when thoſe compounded Tendons, to wit, two together, ſhall be joyned, one compound Tendon enters the middle of the fleſh, and the other embraces the middle on both parts. This is evidently diſcerned in the Maſſeter or Throat-muſcle, the Deltoid, and divers others, in all which, even as in a ſimple Muſcle, whilſt the fleſhy Fibres (to which only the motive power belongs) are contracted, the oppoſite Angles are enlarged according to the inſertions of the Tendons, and ſo the bellies being made ſhorter, and at the ſame time thicker, do ſwell up.

In a ſimple Muſcle, according as one Tendon or both together, or either by turns, ought to be drawn; beſides, according as the part to be drawn is thin, or broad, or planted near or far off, and for ſeveral other reſpects the fleſhy belly is diverſly formed; and as the Rhomboides is its chiefeſt regular figure, yet that alſo is ſometimes triangular, ſometimes trapezial or quadrangular, pyramidal, ſpiral, ſemilunar or like an Half-moon, or of ſome other irregular form. But in all theſe kind of Muſcles, the fleſhy Fibres, according to all their poſitions, whilſt they are contracted, at the ſame time intumifie or ſwell up, and are ſhortned from either end towards the middle, though in all Muſcles not always in a like manner and dimenſion; for if either Tendon be to be drawn at once, the contraction from either fleſhy end, is for the moſt part equal; but at the ſame time, if one only be drawn from the others that are immoveable, the contraction is made leſs, and ſometimes, *viz.* where the fleſh immediately ſticks to the bone without any notable Tendon, almoſt none.

The compounded Muſcles are diſtinguiſhed with a far greater variety; for beſides their diverſity of figures, all which would be an immenſe labour to enumerate, according as they are more or leſs compounded, or have their bellies more or fewer, with a manifold Series ſtretched out here and there, with Fibres ſometimes of the ſame, ſometimes of a divers order, they are very much differenced.

The more thin and leſs compounded Muſcle, when perhaps it is ſorted into two or three bellies, diſpoſed in the ſame being plain, hath the ſeries of fleſhy Fibres for the moſt part looking diverſly, all the exteriour Tendons embracing one end of the Muſcle, and hath the others intermediate or that come between immerſed about the other end; ſo that the ſeveral fleſhy Fibres of every Belly lye parallel between the one extreme Tendon and the other intermediate Tendon. The thicker and more compounded Muſcle, that it might perform at once quick, hard, and long motions, hath many bellies planted in divers plains, and the ſeries of fleſhy Fibres (which are all ſhort) looking many ways. The frame of them, although it be very intricate, that one can ſcarce number all the bellies, much leſs obſerve their habitudes, mutual dependences, and means of connexions among themſelves; yet they may in ſome ſort be reduced to this common Rule in moſt, to wit, in the great compounded Muſcles, ſuch as are thoſe round ones which contribute mighty ſtrength and elaſtick force to the middle of the Arms and Legs, we may take notice, in one end of two vaſt exteriour Tendons covering almoſt the whole ſuperficies of the Muſcle, which being divided preſently into many fiſſures or clefts, are ſtretched out between a broad ſhoot or claw to the other extremity of the Muſcle; then on the oppoſite ſide, about this other end, a great Tendon enters the middle of the fleſh, which alſo is cleft or divided preſently into many laps, diſtributed through the whole interiour belly of the Muſcle. And as theſe interiour lamens or laps meeting with the exteriour, and being ſtretched out almoſt to the oppoſite end, look many ways, and have their ſuperficies turning

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on every ſide, ſome every where are deſtinated to others oppoſite, and are committed or ſent through the intervenient ſeries of the fleſhy Fibres: ſuch a Muſcle, whoſe very many bellies being planted in divers plains, do look many ways, can by no manner or way be cleft or pulled aſunder, but that the other ſeries of fleſhy Fibres muſt be broke aſunder in the midſt. The bellies of a Muſcle, ſo very much compounded, although manifold, yet are very ſlender, ſo that the fleſhy Fibres thereof being moſt ſhort, and having their Angles always equal, but oblique, with the tendinous laps, for that cauſe make a moſt ſtrong attraction. Becauſe the numerous ſeries of fleſhy Fibres ſeem as it were ſo many diſtinct poſts or ſupporters ſet together for the moving of any weight, or rather, for that either great Tendon is preſently ſo cut into many lappets, it is like, as if a mighty draw-rope, hung for the drawing up a body, ſhould be preſently divided into many little ropes or cords, by which many men might draw at once. For whilſt the ſeveral ſeries of the fleſhy Fibres are ſhortned at once, they draw the oppoſite Angles of all the tendinous lappets together, and ſo the belly of the whole Muſcle being intumified or ſwelled up, they ſtrongly draw either end, or that which is moveable towards the middle.

On every Muſcle, both ſimple and compound, there is ſtretched on every ſide a membranaceous covering; beſides, other little Fibres tranſverſe, to wit, membranaceous, are woven between the direct moving fleſhy Fibres of every one, which clothe each of them, and keep or faſten them together, yea (as it ſeems probable) they both communicate to all the fleſhy Fibres the ſame inſtinct of obeying the motion, and alſo carry to the Tendons, the troops of the inflowing Spirits, received from the Nerve.

The Arteries and Veins, inſerted in the middle of every Muſcle, ſend forth little branches on all ſides, obliquely cutting the moving Fibres, from which leſſer branches diſperſed between the *Interſtitia* of the fleſh, water them all with a flux or reflux of the blood. But the Nerve entring the fleſhy belly of every one, diſtributes ſome ſmaller circles only in the neighbouring parts, as it were bearing only the Symbol or mark of the commanded action, commands the execution of it to the Guard or inferiour Company of the fleſhy Fibres and membranaceous Fibrils.

I had deſigned Figures, almoſt of every kind of Muſcles, to be engraved according to the natural appearances: but the Printer making haſte, I had not the opportunity to diſſect an humane Body, having only taken ſome few Muſcles from the Leg of an Ox, we have cauſed them to be delineated to the life, which are to be ſeen at the end, although the famous *Steno* hath already accurately performed this task. Which Figures, if any one think too much bending to Mathematical Rules, he may with an eaſie labour behold the ſame Conformation of a Muſcle, as he hath deſcribed it in the fleſh it ſelf. For if a ſimple regular Muſcle be cut out of any Animal, and ſo placed, that the Tendons here and there be held on the ſides, the fleſhy Fibres between them intercepted in oblique and equal Angles, be preſſed upon an Horizontal plain, the fleſh will be exactly like a Rhomboides or an oblique angular Parallelopipedum. Then if the ſite of the ſame Muſcle being changed, and its Tendons placed above and below, you ſhall cut long-ways the inferiour Tendon, and pull the parts one from another, and divide by tearing the whole Muſcle into two parts, you ſhall preſently ſee a moſt elegant ſpectacle, all the fleſhy Fibres diſpoſed in one ſeries, yea and parallel between themſelves, and of the ſame longitude, to proceed from one Tendon into another, and to make both Angles always oblique and equal; although we cannot cleave after this manner the compounded Muſcles, whoſe manifold bellies have a diverſe plain, yet it will eaſily appear, to one curiouſly cutting them, either raw or boiled, two Tendons to be fitted to each Parallelogram of the fleſh.

As to what reſpects the action of a Muſcle, we plainly ſaw in diſſected living Creatures, (which only ſhew this) that it is contracted, yet not ſo as the old Opinion declared, to wit, that the Fibres being contracted from the end towards the beginning, one extremity of the Muſcle was carried towards the other; but the fleſhy Fibres only and their ends are ſeen to be contracted towards the middle, the Tendons being ſtill unchanged and altered neither as to their longitude or thickneſs: which thing alſo the moſt Learned *Steno* did firſt of all obſerve long ſince. This is clearly perceived in the Diaphragma and the Muſcles dedicated for Reſpiration, which are moved with a conſtant change: for as often as the Muſcle is contracted, you may behold all the fleſhy Fibres, in either extremity, to be pulled together at once, and as if they would enter on either ſide one another to be carried nearer, and ſo at once to become

become ſhorter and thicker, then from that conſtriction to return looſe to their wonted longitude and ſlenderneſs. Whilſt you behold this to be ſo done, you will eaſily think, that ſomething, to wit, ſpirit or ſubtil matter doth flow from the Tendons into the fleſh or fleſhy Fibres, which entring them on either ſide, blows them up, and at the ſame time draws them together nearer within themſelves, that preſently all the Fibres are made ſhorter and intumified; then when that matter recedes from the fleſh or fleſhy Fibres into the Tendons, the Fibres being emptied and looſned from their corrugation or wrinkling, are reſtored to their former longitude, and ſo by turns: whether this in truth be ſo done or no, ſhall be diſcourſed anon.

In the mean time, that we may proceed to other appearances of Muſculary Motion, if that the Membrane of the Muſcle being drawn away, you ſhall ſeparate ſome fleſhy Fibres from others by cutting the little fibrils, whereby they are joyned, and looſen them quite, you will ſee them ſo ſingular and free, to be wrinkled or drawn together in every motion like the others compacted together.

Further, I advertiſe you, that theſe Fibres ſo looſned and freed, ſome cut off in one end, and ſeparated from the Tendon, did yet contract themſelves to the motion of the Muſcle, together with the other Fibres, about the other whole end, without that cut off in the mean time growing flaggy or looſe. After this I divided with a pair of Sciſſers, a certain fleſhy portion of the thinner Muſcle, in three or four pieces tranſverſe, the bigneſs of an inch: which being done, the portions cut off in either end, only entred into, for a ſhort ſpace, ſome light and inordinate corrugations, and preſently became immoveable. The other extreme portions of the Muſcle ſo cut, ſticking to the Tendons, continued to be much more lively and longer contracted, but irregularly and convulſively, to wit, with a certain intortion of the Fibres. Truly, in the Fibres ſo cut off, ſome ſmall footſteps of contraction did remain for a little while, partly by reaſon of the Inſtinct of Motion delivered through the membranaceous fibrils, by which they did yet cohere with the whole fleſh, and partly becauſe the animal Spirits, implanted in the fleſhy Fibres, now divided from the reſt, and left without influence, did exert or put forth their utmoſt contractive endeavours after the uſual manner. For this reaſon ſometimes in the Heart taken out, and in a piece of it cut off with a Sword, as alſo in other Muſcles, after the Nerves and ſanguiferous Veſſels are cut off, a contraction and relaxation continue for ſome time. The other Fibres cut off only by reaſon of the acceſs and receſs of the Spirits from the Tendons, were able ſtill in ſome meaſure to be contracted and relaxed.

When in the Diaphragma I had freed many ſingular Fibres from the knittings of others, I tryed what Ligatures put in ſeveral places of them might effect. Some of them then being bound about the middle, were contracted even as the whole fibres, but with ſome little ſwelling about the Ligature. When I had bound others about the ends, where they cohere to the Tendons, now one, then another, the motion was chiefly and almoſt only continued about the free end. Further, in the fibres bound at both ends at once, the contraction wholly ceaſed.

Contraction and Relaxation are not only ſeen, and indeed probable, in the Heart, but in the Diaphragma and other Muſcles appointed for Reſpiration, which uſe to be performed in all, acting viciſſively, according to the Inſtincts of Nature, and for the moſt part equally (though there are not the like intervals of motions in all) yea, and the Muſcles ſerving to the voluntary function, enter oftentimes into ſpontaneous Contractions, unleſs they be hindred by their Antagoniſts, as it appears, for that the Spaſm or Cramp of one Muſcle comes upon the Palſie of another. Contraction and Relaxation are iterated more ſwiftly in the Heart, than in the Muſcles of Reſpiration, and ſo perhaps in theſe, than in ſeveral others. In thoſe ready to dye, the fleſhy Pannicle every where trembling, clearly ſhews their changes by innumerable beatings or leapings.

As to what reſpects the Humors, whereby all the fibres of a Muſcle, *viz.* the fleſhy, tendinous, and membranaceous, and what lies between them, ſeem to be watered, filled, or blown up, we ought to take notice of them, at leaſt two of them, (to wit, the bloody and nervous liquor) if not more. And in the firſt place it is clearly manifeſt to the ſenſe, that the blood doth waſh all the fleſhy and membranaceous fibres which are interwoven with theſe: becauſe, if the Spirit of Wine, tinctured with Ink, be put into an Artery belonging to any Muſcle, the Vein in the mean time being tyed cloſe, the ſuperficies of all the fleſhy fibres and tranſverſe fibrils are dyed with blackneſs, the Tendons being then ſcarcely at all changed in their colour; it appears from hence,

hence, that the blood doth every where outwardly water all the fleſh or fleſhy fibres, and only thoſe. We have not yet found by any certain mark, whether the blood enters more deeply the fleſhy fibres, or inſtils into them the ſubtil liquor falling from them, although this laſt ſeems moſt probable; but indeed we affirm, that all the fibres, *viz.* the fleſhy, tendinous, and membranaceous, are perpetually and plentifully actuated by the implanted and inflowing animal Spirits, and conſtantly imbued with the nervous liquor, which is the Vehicle of the Spirits. But how far, or how much the aforeſaid humors conduce to the exerciſe of the animal Faculties, doth not eaſily appear; but becauſe the animal Spirits cannot conſiſt without the nervous liquor, and depend very much upon its diſpoſition, we may conclude, that it doth ſerve ſomething to the actuating the motive power; for that reaſon alſo, that the continual afflux of the blood is nevertheleſs neceſſary, an Experiment cited by the Ingenious *Steno*, and proved of late by others, plainly confirms. He hath obſerved, that in a living Dog, the deſcending great Artery being tyed without any previous cutting off, the voluntary motion of all the poſterior parts have ceaſed, as often as he tyed the ſtring, and as often returned again as he looſned the knot.

Theſe are the chief Phænomena to be obſerved concerning the frame and action of a Muſcle in the diſſection of Animals, both of ſuch as were living, as alſo of the dead and dying. From which, however placed together and compared among themſelves, how difficult a thing it is to conſtitute the Ætiology of the animal motive faculty, appears even from hence, that the moſt Ingenious *Steno*, after he had very accurately delivered the Elements of his Myology, by himſelf firſt invented, nevertheleſs he wholly avoided that Hypotheſis which might be founded out of them; for that he yet doubted, whether the explication of a Muſcle by a Rectangle were convenient to Nature in all; wherefore when many run to the manner of muſculary Contraction, by the repletion of the fibres, and others from their inanition, and ſome to both, he ingenuouſly profeſſes, that the true cauſes of this thing do not clearly appear to him.

And as to this abſtruſe matter, although I do not believe that I am able to bring to light, or ſhew any thing more certainly than others; yet as in mechanical things, when any one would obſerve the motions of a Clock or Engine, he takes the Machine it ſelf to pieces to conſider the ſingular artifice, and doth not doubt but he will learn the cauſes and properties of the Phænomenon, if not all, at leaſt the chief: In like manner, when it is brought before your eyes to behold and conſider the ſtructure and parts of a Muſcle, the conformations of the moving fibres, their geſts and alterations whilſt they are in motion, why is it that we ſhould deſpair to extricate the means or reaſons of the motive function, either by truths or by what is next to truth? Wherefore I think it may be lawful for me here to bring before you our conceptions and notions concerning this thing, indeed not raſhly taken, or to comply with our former Hypotheſis, or to oppoſe any other; which if they ſhall not ſatisfie all, may at leaſt excite others to find out better.

But we ſhall here repeat what we have mentioned before, *viz.* that the power or virtue by which a Muſcle is moved, proceeds from the Brain, is conveyed through the Nerves, and is performed by the fleſhy fibres contracted, and by that means abbreviated. This latter is proved by ocular demonſtration, yea it appears by it, that the motive force doth depend alſo upon thoſe former, and is ſo transferred by a long paſſage, that the influence of the Spirits being ſuppreſſed in their beginning, or intercepted in the way, for that reaſon the exerciſe of the deſigned motion may be hindred. Further we notifie, that the motive force is far greater in the Muſcle, or in the end, than in the beginning or middle: becauſe the Brain and depending Nerves are made of a tender and fragil ſubſtance, and can pull or draw nothing ſtrongly; but the Muſcle putting forth ſtrongly its contractive force, ſeems almoſt to be equal to the ſtrength of a Poſt or Crow, or of a Pully or Windlace. Sometimes the local motion is a compound Action to be performed of many Organs, which conſiſt in divers places, and as its virtue is far more ſtrong in the end than in the beginning or way, we will inquire by what means, as it were mechanical, the motive force may be ſo augmented or multiplied in its progreſs, then what is brought to the motion from the ſeveral Organs.

As to the firſt, in Artificial things, when for the facilitating of motion, and the increaſing the moving force, many Inſtruments are invented, all of them, or at leaſt the chief, may be reduced to theſe two Heads, *viz.* firſt, either the ſame force or impreſſion may be continued, without the addition of any new force, from one term

or end to the other, or from the firſt mover to the thing moved, which notwithſtanding may be much increaſed in the way, as the Centers of Gravity are farther off or multiplied; for the farther the motion is begun from the firſt Center of Gravity, the ſtronger it proceeds, as is beheld in a Crow or Leaver, and in other things reducible to a Leaver. Then if other things be diſpoſed beyond the firſt Center of Gravity ſucceſſively before the end of the motion, as in a circular Wheel, the ſame motive force is wont to be increaſed very much. But to this there is required, that the inſtruments of motion be ſufficiently ſtrong and tenacious in their whole tract; for otherwiſe the motive force being increaſed, the ſame breaking falls down before the deſigned action be performed. Secondly, there is another way of multiplying the motive force to a great degree, and alſo at a great diſtance, which is performed with the addition of new forces or of freſh ſupplies, to wit, when the elaſtick Particles, or thoſe making the force, being diſpoſed and ſhut up in private places, as it were little Cells, afterwards, as occaſion ſerves, are ſent forth by a light contact or blaſt of a remote Agent, into the liberty of motion, which they readily perform. By this means, Air compacted and ſhut up, when it is permitted to get out, impetuouſly forcing a Bullet or other object, ſends or drives it out a great way. It is ſufficiently known what mighty and often horrid forces Gun-powder yields about the end of the Exploſion, when in the beginning or firſt inkindling, the force being tranſmitted through the fiery fume, as yet weak, might be reſtrained by a light impreſſion of the hand. There are alſo other exploſive little bodies of a various kind, which being hid in convenient Boxes or Cells, when they are raiſed up into motion by an inkindling, or irritament, or provocative, do often exert an incredible force. It behoves us then to inquire from which of theſe ways it comes to paſs, that the motive force doth in the Muſcles ſo far exceed the force tranſmitted from the Brain through the Nerves, or whether the action of the Muſculary Motion be merely contractive, or rather elaſtick, or in ſome meaſure exploſive?

Concerning theſe things it manifeſtly appears, that the Muſcles do draw, to wit, being abbreviated, do bring the Tendon with the hanging part towards it ſelf. Further, for as much as there is need for the offices of traction to be ſometimes more ſtrongly, ſometimes more weakly performed by them, ſo to have the Centers of Gravity now nigher, now farther off planted from the beginning of the motion; hence the Muſcles which extend or bend the Thigh, eſpecially the *Pſoæ* and *Glutæi* (great Muſcles beginning in the Breaſt, and reaching into the Thigh) do hide their fleſhy moving fibres deeply within the Trunk of the Body: but thoſe which turn about the Thigh are conſtituted either near the hole or the riſing of the Bone of the Thigh, or ſomewhere thereabout; in like manner it is obſerved in all the reſt of the members, that the belly of the Muſcle gets a more remote or nearer ſite from the article or hinge of motion, as it deſigned for performing either a ſtronger or weaker motion: But truly this doth not hold as to the other moving parts, to wit, the Brain and Nerves, which cooperate with the Muſcles in the motive Act; becauſe, although the motive force is carried by a long paſſage through all theſe Organs, yet it ſeems impoſſible, that a contraction ſo ſtrongly performed by a Muſcle, ſhould be begun by the tender and immoveable Brain, and continued through the ſmall and fragil Nerves, but that it muſt neceſſarily be ſuppoſed ſome motive Particles are hid in the Muſcle, which, as occaſion is given, are ſtirred up according to the Inſtinct, delivered by the Nerves from the Brain, into motion, as it were with a certain exploſion. But what theſe Particles may be, by what means they are inſtigated into motion, and how they induce the contraction of a Muſcle, ſeems moſt difficult to be unfolded.

Truly it may be lawfully concluded from the effect, that elaſtick Particles, and fit to move themſelves, are contained in the Muſcles, and hid every where within the fibres, becauſe the Anatomy of living Creatures diſcovers often a motion in a ſeparated Muſcle, yea in its fibres divided one from another. The Hearts of ſome Animals beat a long while being pulled out of the Body, the Muſcles cut off, ſometimes perform the motions of contraction. In great labouring Beaſts ſlain or dying, although the Heart and the Brain be taken out, the fleſhy Pannicle performs for ſome time very many turns of contractions and relaxations. From theſe it is manifeſtly clear, that there are among the Particles of the Muſcles ſome agil and ſelf forcers, or carried by their own force heaped together, which, although the animal œconomy be very much diſturbed or overthrown, do enter into motion of their own accord, yet in a tranquil eſtate they perform no actions, unleſs commanded by the Brain or Cerebel, and delivered by the Nerves.

Whilſt

Whilſt a Muſcle is contracted, the cutting up of a live Creature ſhews only the fleſhy fibres to run into motion by themſelves, to wit, being made more tumid, ſharper, and ſhorter at the ſame time, to amplifie or enlarge the belly of the Muſcle, and in the interim, the Tendons, as if immoveable of themſelves, to wit, not altered either as to their thickneſs or length, only pulled as it were by the fleſhy fibres, to be moved, and to draw with them the moved part; whence it ſeems to be manifeſt, that the animal Spirits or elaſtick Particles, whichſoever they are, whilſt they perform the Muſcular Motion, are only or chiefly agitated among the fleſhy fibres. Further, hence any one may ſtrongly think, that ſuch Particles are not at all contained, or are wholly idle in the tendinous fibres; for as we have noted, that the Tendon is not changed in the act, we may lawfully ſuſpect, that it is only inſtead of a Crook, by which means the fleſhy fibres being contracted, may draw the member to be moved at a diſtance from them towards themſelves.

But indeed it ſufficiently appears by evident ſigns, that the animal Spirits or elaſtick Particles do lodge within the tendinous fibres, and truly much more plentifully than in the fleſhy: Firſt, the ſenſe ſhews this, to wit, the touch, which is much ſharper and far more ſenſible in the Tendon than in the fleſh: yea any irritation or breach of the unity happening in that part, brings not only a moſt troubleſom ſenſe, to wit, a very cruel pain, but beſides, is wont to excite in the neighbouring fleſh a Tumor or Swelling, and frequently moſt grievous Convulſions; whence we neceſſarily conclude, that the animal Spirits do inhabit the tendinous fibres in great abundance: but what they do there, and by what means they ſerve to the motive function, we will next inquire.

As often as the motion of a living Muſcle was beheld by me, I conſidered and weighed in my mind by what means all the fleſhy fibres were contracted and releaſed by turns, I could conceive or collect no other thing than that in every contraction, the Spirits or certain elaſtick Particles did ruſh into the fleſhy fibres from either Tendon, and did intumifie and force them nearer towards themſelves or together; then the ſame Particles preſently coming back from the fleſh into the Tendons, the relaxation of the Muſcles happened. In a bare or naked Muſcle, when I had ſeparated every fleſhy fibre or a company of them apart from the reſt in the whole paſſage by help of a Microſcope, I moſt plainly perceived the Tumor, begun at either end of the fleſh, to be carried towards the middle, as it were by the Spirits, entred here and there at once. Further (which I mentioned before) each fibre being tyed about the middle, being as it were as yet free and compacted with the others, was contracted or drawn together; but a Ligature being put to both ends, it remained flaggy conſtantly above or beyond the bound place. But that I might no longer doubt concerning this, I applied two Ligatures, at equal diſtances from the middle and the ends, about the ſame bundle of fleſhy fibres, which being done, a contraction and ſwelling up ariſing preſently from either fleſhy extreme to the places bound, went no farther; the middle part between in the mean time being unmoved, remained flaccid; whence it may be well concluded, that in every muſcular contraction the animal Spirits or elaſtick Particles do leap out from the tendinous fibres into the fleſhy, and viciſſively in the relaxation, recede or run back from theſe into thoſe.

However this being proved and granted, there yet remain very many difficulties concerning Muſcular Motion; for firſt, it may be asked how the animal Spirits, which enter ſilently, or without any incitation, or Tumor, the tendinous fibres do ſo blow up the fleſhy fibres, that they are able to force them altogether into ſhorter ſpaces.

For the producing this effect, plenty of Spirits leaping from the tendinous fibres, do not ſeem alone ſufficient; but beſides, we may ſuppoſe ſome other kind of Particles, implanted in the fleſhy fibres, meeting with the others flowing from the Tendons, do forthwith ſtrive, whence a mutual rarefaction, and turgeſcency or ſwelling up of them, or an inflation or ſudden blowing up of the containing bodies, together with an abbreviation or ſhortning of them, doth ariſe; not much unlike, as when the Corpuſcles or little bodies of fire entring into a piece of leather, or any thing, and forcing variouſly here and there its implanted Particles (whereby they are preſently inſnared) make it ſo to be ſtuffed and wrinkled; in like manner alſo the animal Spirits, although they paſs through the Tendons, where they are ſolitary or by themſelves, without moving them (as the Effluvia's of heat in Metals or more dry bodies) yet being dilated in the fleſh, for that there joyning with elaſtick Particles of another kind,

kind, they are expanded or ſtretched out, they cauſe the ſudden inflations and corrugations of the containing fibres. But we have elſewhere ſhewn, that ſuch Particles divers and wholly heterogene to the nature of the Spirits, may be copiouſly and eaſily carried to the Muſcles. For indeed it is plain by ocular demonſtration, that the blood doth every where waſh and water outwardly all the fleſhy fibres, which beſides, it is thought not only to nouriſh, but alſo to be buſied about the offices of the animal Function: and what can be leſs ſuſpected, than that it doth inſtil into their Pipes a certain ſubtil liquor, whoſe Particles being agitated, and alſo rarified by the Spirits flowing therein, ſtuff up the fibres, (as we but now hinted) and compel them intumified, by reaſon of the aſſault on either ſide made, into ſhorter ſpaces?

But that the fleſhy belly of the Muſcle, whilſt it is contracted, doth ſwell up, is not at all to be doubted, becauſe this is evidently beheld by the ſight and touch in the diſſection of living Creatures: to wit, all the fleſhy fibres being wrinkled together, are made more tumid and ſharper, and ſo ſhorten the Muſcle, and make it alſo thicker and broader: For the more certain belief of this, when I had bound ſome of the fleſhy fibres, ſeparated from the knitting of the reſt, and had left others near them looſe, there appeared a notable difference between thoſe flaccid or not ſwelled, and theſe intumified or ſwelled up in every contraction of the Muſcle.

But if it be demanded, of what nature, to wit, whether ſpirituous ſaline, as may be believed, or of any other diſpoſition, the animal Spirits, derived from the Brain into the Muſcles, may be; and then whether the other Latex, immediately carried to them from the blood, is ſulphureous or nitrous. Concerning theſe, becauſe it appears not to the ſenſe, we ſhall pronounce nothing raſhly or poſitively. But even as in other natural things, the active Particles of a various kind, which being unlike among themſelves, are found apt mutually to grow hot, or to be ſtruck off from one another, or otherwiſe to be rarified or expanded; and as the inteſtine motions of Bodies, and eſpecially the elaſtick, ſuch as are the contractions of the Muſcles, can only proceed from the congreſſions of ſuch like, certainly it may be lawful to preſume, that theſe do wholly depend upon ſuch a cauſe.

Therefore as to the Muſcular Motion in general, we ſhall conclude after this manner, with a ſufficiently probable conjecture, *viz.* that the animal Spirits being brought from the Head by the paſſage of the Nerves to every Muſcle, and (as it is very likely) received from the membranaceous fibrils, are carried by their paſſage into the tendinous fibres, and there they are plentifully laid up as in fit Store-houſes; which Spirits, as they are naturally nimble and elaſtick, where ever they may, and are permitted, expanding themſelves, leap into the fleſhy fibers; then the force being finiſhed, preſently ſinking down, they ſlide back into the Tendons, and ſo viciſſively. But whilſt the ſame animal Spirits, at the inſtinct given for the performing of motion, do leap out of the tendinous fibers into the fleſhy, they meet there with active Particles of another nature, ſupplied from the blood, and preſently they grow mutually hot; ſo that by the ſtrife and agitation of both, the fleſhy fibres, for that they are lax and porous, are ſtuffed up and driven into wrinklings, from all which being at once wrinkled or ſhrivell'd up, the contraction of the whole Muſcle proceeds; the contraction being finiſhed, the ſincere or clear Spirits, which reſide or are aſſwaged, go back for the moſt part into the tendinous fibres, the other Particles being left within the fleſh; the loſs or waſting of theſe the blood ſupplies, as the Nerves do thoſe. By what inſtinct the muſculary contraction begins and ends, ſhall be inquired into preſently.

That the animal Spirits, flowing from the tendinous Fibres, may enter equally all the fleſhy, there are two Tendons in every ſimple Muſcle, which are ſo conſtituted, according to oppoſite Angles, that the Spirits running to them from a twofold ſtarting place or bound, might preſently fill the whole belly of the Muſcle, and that motion being finiſhed, might immediately ſwiftly retire. If the contraction ought to be performed indifferently towards the middle of the fleſh, the Tendons for the moſt part are equal; but if the motion inclines more towards one region of the fleſh, one Tendon (to wit, which may ſupply a greater company of Spirits) exceeds the other in magnitude. If the Muſcle, whereby it may be the ſtronger, is big and endued with an ample bulk or ſubſtance, it is divided as it were into many Lobes or Bellies, and two Tendons are ordained to each of them; to wit, to the end that the animal Spirits might be carried through ſhort paſſages from the Tendons into the fleſhy fibres, and might leap back again: becauſe the compounded Muſcle doth not always contain more ſeries of moving fibres, that it might perform many and divers motions,

but

but that it might make the ſame motion often with the greater ſtrength. For, as we hinted before, as a ſimple Muſcle was as a ſingle leaver or bar, the compound ſeems as if it were many leavers or bars ſerving for the removing the ſame body conjunctly.

Further, hence we may obſerve in ſome Muſcles, which are ſimple and regular, that all the fleſhy fibres are equal, and ſo all the tendinous of one extreme being put together, are equal to all of the other end being put together; yet they ſingle, where they are ſhorter in one Tendon, are longer in the other, and ſo diſpoſed, that the tendinous fibres on either part, the top and bottom, have their exceſſes inverſe, and at once equal; to wit, that here a long is laid upon a ſhort, or the longeſt upon the ſhorteſt, and there quite contrary, the ſhorteſt upon the longeſt, to the end, that the motion might be ſo made every where in this or that ſide of the Muſcle, or at the end more ſtrong, more plentiful Spirits flow together into thoſe parts from the longer tendinous fibres, and on the contrary: wherefore in ſome Muſcles leſs neceſſary, where the part of the fleſh growing to the bone, either becomes immoveable, or only ſerves for the filling up of empty ſpaces, one Tendon is ſhorter or leſſer, and oftentimes degenerates into a bony or cartilaginous hardneſs. Further it is obſerved, as to other ſtrong and greatly moving Muſcles, that their Tendons are not ſo diſpoſed, as if they were only ſtays, props, handles, or hanging crooks of the fleſhy fibres; for ſo they are only conſtituted in their extreme ends; yet the tendinous fibres, that they may be made more apt promptuaries of the animal Spirits, being ſtretched out almoſt into all parts of the Muſcle, receive every where both ends of the fleſhy; which indeed yet more manifeſtly appears in the compound Muſcles, for that one Tendon being compounded, embraces the extreme fleſh, and the other enters into the middle of the fleſh, as hath been already ſhewn.

But truly the animal Spirits, whilſt they leap out of the tendinous into the fleſhy fibres, are not ſufficient of themſelves for the wrinkling of them, but require another elaſtick Copula from the blood; this may be argued from many reaſons. Firſt, it ſeems to appear from this, that the ſame Spirits being ſolitary or by themſelves, though moſt thickly planted within the Tendons, ſtir up no Tumor or Contraction whilſt they are moved in them; wherefore being dilated within the fleſhy fibres in a leſſer quantity, and having got a larger ſpace, they would be ſtretched out, unleſs they met or ſtrove with other Particles, much leſs would they obtain a contractive force. Beſides, when any wound or grievous trouble happens to a Tendon, the belly of the Muſcle or fleſhy part is chiefly troubled with a Tumor or Spaſm; for the Spirits being irritated, not ſo much within themſelves, but where they are violently driven among heterogene Particles, ſtir up the greateſt tumults and inordinations. But further, when the fleſhy fibres are watered with the ſanguineous humor beyond other parts, and more than may ſuffice for their nouriſhment, for what other uſe ſhould it be aſſigned, unleſs that it may contribute to the motive function? Eſpecially we take notice in lean Bodies, which are more ſparingly nouriſhed, that the Muſcles being fuſed or drenched with more plentiful blood, do perform the ſtrongeſt endeavours of motions: moreover, it doth not appear by what way beſides, the expence of the Spirits in a Muſcle, conſumed with continual hard motions or labours, ſhould be made up or renewed, unleſs, beſides the ſmall ſupplements by the Nerves, others ſufficiently plentiful ſhould be ſupplied from the bloody maſs. Add to theſe, that members deſtitute of the wonted afflux of blood, eaſily fall into weakneſs or a Palſie; and that from the obſervation of Doctor *Steno*, in a live Dog the trunk of the deſcending Artery being tyed, all the lower or poſterior members were ſuddenly deprived of motion. And though it doth not yet appear plainly to me, whether the excluſion of the blood from the ſpinal Marrow, or from the Muſcles themſelves, or from both together, be the cauſe; yet however it comes almoſt to the ſame thing, for as much as the animal Spirits being procreated within the Head, and ſtretched out by the medullary and nervous Appendices into every member, without the concourſe of the blood, they ſhould not be able to perform the loco-motive power.

Having thus far explained by what means a Muſcle being contracted in the fleſhy part, as to all the fibres at once, performs the motive function; we ſhall next inquire, what is the reaſon of the Inſtinct whereby every motion, both regular and irregular, is wont to be obeyed or is performed. Concerning this in general, it firſt appears, that the motions of every regular motion, yea and the impulſes of ſome irregular motions being conceived within the Brain or Cerebel, are tranſmitted from thence by the

the Nerves to every Muſcle. This (as we have elſewhere ſhewn) is moſt evidently declared by the effects and conſequences: yet here great difficulties remain, to wit, how by the ſame paſſages freſh forces of animal Spirits are conveyed from the Head to every Muſcle, and at the ſame time the old ones exerciſing the Empire of the Soul; beſides, with what difference and divers carriage of the inflowing Spirits, the Nerves perform either of theſe tasks, or both theſe offices.

Of theſe, as I conjecture, it ſeems that the animal Spirits, which flowing continually from the Head to refreſh the forces of the implanted Spirits, are carried to the Muſcle by the Nerves, do move to it quietly and eaſily, and being there preſently received by the membranaceous Fibres, they go apart into the Tendons: which kind of relief, although it ſhould be but little in bulk, yet becauſe it is carried night and day by a conſtant courſe, it eaſily ariſes to a ſufficient proviſion for the continual filling up of the Tendons. But that we ſuppoſe, the Spirits ſo brought perpetually to the Muſcle to be transferred by the membranaceous Fibres, and not by the fleſhy, to the Tendons, the reaſon is, becauſe if they ſhould firſt enter into theſe, ſtraight running into an elaſtick Copula, they would ſtir up the Muſcle into continual motions: more over, for that in the Heart and Muſcles of Reſpiration the fleſhy Fibres are exerciſed with a perpetual motion, they wait not for the paſſage of freſh Spirits to the Tendons.

But as to what reſpects the Inſtincts delivered through the Nerves from the Head for the performing, or ſtaying, or any ways altering of the muſculary motion, of theſe we ought firſt to conſider, that the moving animal Spirits, whoſe companies or throngs conſtitute the Hypoſtaſis of the bodily Soul, have theſe two properties as it were implanted in their nature; to wit, that whilſt they are lively, numerous, and free, they exert or expand themſelves, then that force being finiſhed, they being a little diminiſhed, retire themſelves and grow quiet; but afterwards being refreſhed, they leap out again, and ſo viciſſively. Waking and ſleep, and the alterations of work and idleneſs or reſt, inbred in all living Creatures, ſufficiently declare this. Wherefore to the impulſe or inſtincts of ſome Muſcles, (which are wont to be perpetually contracted and releaſed) ſcarce any thing more is required, but that their Tendons may be ſupplied by the Nerves with a conſtant influx of animal Spirits; but the Spirits themſelves, becauſe they are numerous and expeditious of their own nature, do willingly leap out into the moving Fibres, then the charge being performed, after a ſmall loſs or expence, they immediately withdraw, and being again preſently recruited, they are again expanded, and ſo viciſſively. Further, their actions (which chiefly are Pulſe and Breathing) are variouſly changed according to the degrees of heat or of the affections, for as much as the Spirits being brought by the Nerves, are ſent from the Cerebel, ſometimes more remiſly, ſometimes more plentifully, or more nimbly.

Further, in ſome other Muſcles ſubject to the Empire of the Appetite, as the animal Spirits naturally affect turns of expanſion and receſs, there is only need of a ſign to be given, either for the performing or ſtopping of the commanded motion; either of which, the inflowing Spirits by their various knocking againſt the Muſcle, eaſily perform, in ordering the implanted Spirits into various aſpects or tendencies. When the Muſcle is contracted, the implanted Spirits, whilſt they are looſned from either end towards the middle, look and tend with a changed front from the middle towards either end. And ſo, whilſt the inflowing Spirits carry the Symbol of performing Contraction, they being incited by heaps within the Nerve, more fully blow up its end, inſerted to the Muſcle, (where they are more thickly crowded together) and ſo cauſe it there to be contracted and abbreviated; whereby it comes to paſs, that the ſame inflowing Spirits, about to enter into the Muſcle, are at that time ſtopped by a mere heap, or rather are called back towards the intumified Nerve; wherefore by and by the whole ſeries of the implanted Spirits (hence their inclination being changed) alſo looks that way, and ſo the inhabitants of the Tendons, leaping out from their little Cells into the fleſhy Fibres, cauſe motive contraction: then the motion is broken off or ceaſes aſſoon as the Spirits being before called back towards the Nerve, do tend again into the Muſcle, and ſo the front of the Army being again changed, bands of the implanted Spirits are preſently compelled into the Tendons. That the thing is in a manner thus, I am perſwaded, not out of a mere agreeableneſs or concinnity of our Hypotheſis, but from Anatomical obſervation. Becauſe once diſſecting a Whelp alive, when by chance I beheld ſome Muſcles of the hinder part of the

Head

Head and Neck divided and ſeparated at the ſame inſtant, wherein the fleſhy Fibres, as alſo the Nerves inſerted into them, were ſeen at once to be contracted, and being intumified, to be abbreviated.

For the promoting the receſs of the Spirits out of the fleſhy Fibres into the Tendons; whilſt the Muſcle is contracted, the membranaceous Fibrils, which every where cut croſs-wiſe the flefly, and thickly ſtick between, ſeem to help. The texture of theſe never to be enough admired, is better perceived in a Muſcle endued with large Fibres, *viz.* an Oxes being boiled to a tenderneſs. For in ſuch a one, if gently opening the fleſhy Fibres, you ſhall draw them one from another through the whole ſeries, you ſhall ſee little Fibrils, like hairs, moſt thickly extended upon every one of thoſe Tubes, which little Fibrils, not only cloſe and knit together the fleſhy Fibres, but alſo lying upon every one of their ſeries, and cutting them in oblique Angles, they alſo are all carried parallel, from Tendon to Tendon, in an oppoſite ſite to the fleſhy: therefore whilſt the Muſcle being contracted, the fleſhy Fibres do ſwell up, the Fibrils embracing them, that they may give place, are ſomewhat diſtended; then as ſoon as the ſwelling up remits, theſe returning to their wonted ſtraitneſs, preſs together every where the fleſh, and the Spirits being expulſed on either ſide, they reduce them to their priſtine length. It makes for this, that whilſt the Muſcle is contracted, the Spirits inflowing through the Nerves, depart from their membranaceous Fibrils; wherefore theſe being empty and lax, are able more eaſily to be diſtended; but whilſt the Muſcle is relaxed, the Spirits again entring the Fibrils, fill them, and that they may the better bind the fleſhy Fibres, they make them ſhorter.

The Inſtincts of Motions, to be obeyed by the Muſcles, ſo delivered by the Nerves, are, being ſent either from the Brain, performed at the command, and with the knowledge of the Appetite; or from the Cerebel, according to the Laws of Nature, for the moſt part unknown to us. But beſides, ſometimes the Muſcles are carried beyond, or contrary to the pleaſure of the Appetite or Nature, into irregular motions, *viz.* violent and convulſive, and that happens after various manners and for divers cauſes. Concerning theſe, ſome time ſince diſcourſing more largely, we have ſhewn, that from thence do ariſe many kinds and differences of convulſive motions; as the Spaſmodick matter being ſomewhere fixed, doth ſubſiſt either about the beginnings, middle, or ends of the Nerves; or becauſe the ſame thing being wandring and looſe, runs about here and there through the whole paſſages of the Nerves, and ſo variouſly transfers from place to place convulſive diſtempers. But beſides theſe divers kinds of Convulſions, which are excited by reaſon of ſome evil or vice ſticking ſomewhere to the Nerves themſelves, this our Myology or Doctrine of the Muſcles, hath diſcovered ſome Convulſions of another kind ariſing from the Muſcles being chiefly affected.

For indeed we muſt advertiſe you, that the animal Spirits, diſpoſed among the Muſcles themſelves, by reaſon of a taint or evil derived from the Brain, or from the Blood, or perhaps oftentimes from both together, are infected with certain heterogene Particles, by reaſon of which they cannot reſt or lye quiet in their Cells; but being always unquiet and reſtleſs, leap out of their own accord from the tendinous Fibres into the fleſhy, and ſo oftentimes produce frequent and cruel Convulſions. But this we have obſerved to be done after a twofold manner, *viz.* firſt, for that the Spirits being burdened with an elaſtick Copula, remain not long within the Tendons, but leaping out from thence into the fleſhy Fibres, induce frequent Convulſions of a Muſcle, but ſhort, and as it were by leaps; or ſecondly, becauſe the animal Spirits, although they ſometimes lye quietly within the Tendons, yet being inordinately ſnatched into the fleſh, and there cruelly exploded, they cannot be preſently repreſſed, brought into order, or reduced into the Tendons, but whether we will or not, they perſiſt a long while expanded, and ſo bring forth a long and very painful contraction of the Muſcle. Which kind of Spaſm, ſufficiently known, we vulgarly term the Cramp.

The former diſtemper (called the Convulſive Leaping) is familiar both to malignant Feavers, and to the Scurvy. As to thoſe, we have ordinarily known, when either no Criſis, or an evil one is obtained, that heterogene Particles from the blood and nervous juyce very much vitiated, are not only laid up in the Bowels, (whoſe diſpoſitions and functions they pervert) but almoſt every where in the Muſcles; and there growing to the Spirits, do affect them with a certain madneſs, ſo as they cannot continue peaceably together, or reſt within the Tendons, but being divided and diſtracted one from another, leap out from thence by bands into the fleſh, and there ſtir up the

leſſer

leſſer and moſt frequent Spaſms or Convulſions. In like manner, by reaſon of the Spirits inhabiting the Muſcles, being burdened with an elaſtick Copula there growing to them, ſome labouring with an inveterate Scurvy, cannot contain their limbs in the ſame ſite or poſition, but are neceſſitated ſometimes to extend the hands or feet, ſometimes to fling them about here and there, to transfer them variouſly, and ſometimes to ſubdue their madneſs by running, leaping, or other hard labours.

Treating ſome time ſince of Convulſive Motions, we did almoſt wholly omit the Ætiology of the continuing Spaſm or Tetaniſm, as a thing which depended upon the Doctrine of the Muſcles, to be treated of afterwards: Then we only hinted, that the contraction of that kind did ariſe in one Muſcle, becauſe its other Antagoniſt was reſolved or looſned, which indeed oftentimes happens in the face and ſome members; in which, whilſt the parts upon one ſide are troubled with the Palſie, thoſe oppoſite on the other, as it were looſned in the Reins, are too much contracted. Notwithſtanding this kind of Spaſm for the moſt part is without pain; beſides, this is not eaſily or preſently paſſed over or cured no more than the Palſie, which is the cauſe of it.

Therefore as to what belongs to the formal reaſon of the Spaſm, called in our Idiom the Cramp; every one labouring with this diſtemper, perceives in himſelf one or more Muſcles to be moſt ſtrongly and involuntarily drawn together, and they being for ſome time ſo highly diſtended, remain as it were ſtiff; and in the mean time, for that the fleſhy Fibres being cruelly contracted, do violently haul or pull either Tendon, to wit, that which is fixed to the immoveable part, perhaps no leſs than the other part to be moved, they cauſe a moſt troubleſom pain. But ſometimes this Spaſm being excited, by reaſon of the animal Spirits carrying themſelves out impetuouſly into the fleſhy Fibres, doth not ceaſe until the ſame Spirits being returned into the Tendons, ſuffer the fleſh to be relaxed; therefore its neareſt cauſes will be both the greater impetuoſity of the animal Spirits among the fleſhy Fibres, with which they leap thither unbid; and alſo their long continuance or ſtay, for that they return back more ſlowly and difficultly into the Tendons. For the ſecondary cauſes may be reckoned, both the evil diſpoſition of the animal Spirits, and alſo the evil conformation of the Tendons, *viz.* ſometimes this, ſometimes that, and not ſeldom both together.

As to the former; this diſtemper, as other Convulſions, ſeems to ariſe, for as much as the animal Spirits, being burdened with heterogeneous Particles or an elaſtick Copula, at length being irritated, they are incited to the ſtriking of it off: which notwithſtanding, being thick and viſcous, and for that cauſe more tenacious, is not ſoon nor eaſily ſhaken off, but that the Spirits being ſtill provoked by the ſame, and ſhut up within the fleſhy Fibres, are longer detained in the expanſion: which thing perhaps happens not ſo much unlike, as when water and air being joyned together, make a bubble; which, if it be made of water, wherein a little Sope is put, is more tenacious, much more large, and continues longer than that made only of mere water. So we obſerve, that they who abound in thick and tartareous humours, are moſt obnoxious to theſe kind of Cramps, and beſides, that they who preſently ſleep upon drinking or eating groſs meats, after full eating, and eſpecially after a large and plentiful ſupper, do ſuffer moſt cruel aſſaults of this diſeaſe; but ſometimes the Tendons themſelves are found to be in the fault, for that they being too hard bound together or obſtructed, they do not eaſily admit the Spirits returning from the fleſhy Fibres. The obſtruction of the Tendons is the cauſe, that Gouty and Scorbutick people, whoſe Tendons ſalt and tartareous humours eaſily run into and obſtruct, are wont to be cruelly tormented with theſe kind of painful Cramps: But that the conſtriction of the Tendons doth ſometimes bring forth this diſeaſe, appears by this, for that ſome Women with Child, (as I have been often told) about the latter end of their Time, by reaſon of the Muſcles of the Abdomen being too much extended, are wont to be troubled with frequent Cramps, only in the bottom of their Bellies. For the illuſtrating of this Pathology we will add this following Caſe.

A Noble Woman, young and fair, ſome time ſince obnoxious to Hyſterick diſtempers, and now above two years ago to Convulſive, and in a manner Epileptical; of late, by reaſon of the frequent and moſt cruel aſſaults of the diſeaſe, ſhe became alſo Cachectical and Paralytical, that at length her Abdomen was diſtempered with an Aſcites, and her Legs with a wateriſh Tumor, and laſtly, all her lower parts, below her Hips, were deprived of motion; hence, as often as the Convulſive fits infeſted her, ſhe was wont, not now to move her body or members here and there, but ſometimes

times theſe, ſometimes thoſe parts being ſnatched with the Tetaniſm, were variouſly bent and twiſted about, that in the mean time, ſhe her ſelf ſitting in her Bed or Chair, remained ſtiff and almoſt immoveable. It is not long ſince, that ſeeing the whole manner of one of theſe Fits, I obſerved, not without great admiration, divers ſorts of turns and changes of alterations of the Spaſms. At the firſt aſſault, her eyes being turned about ſwiftly hither and thither, ſhe was preſently taken with inſenſibility, then by and by her head being turned and contracted of one ſide, preſently her arms and legs at once became ſtiff, and all her Joynts, ſometimes of one ſide, ſometimes of both, were bowed or ſtretched out: perhaps after four or five minutes theſe Spaſms both in her Head and Limbs remitting, of a ſudden others, for the moſt part oppoſite, followed; which being often finiſhed in the like ſpace, others far different did ariſe, and ſo for two or three hours, longer Spaſms almoſt of every kind and faſhion, being excited through her whole Body, followed upon one another; ſo that her head being convulſed or pulled by turns from the right to the left, and contracted before and behind, yea and all her Limbs being bent inwardly here and there, or diſtended outwardly in the Courſe of one Fit, ſhe exhibited all ſorts of Convulſive geſtures. When at any time the Spaſms of one ſort continued longer in the Head or Limbs than uſual, it was the cuſtom of the Servants about her to blow up ſtrongly into her Noſtrils the Fume of Tabaco; which being done, as the Spirits recovered within, the preſent Spaſms immediately remitted, but upon them others of a new kind ſucceeded. Of late the Legs of this Lady were ſo debilitated by being looſned, that ſhe could neither go nor ſtand, yea her Tendons under either Ham, being made tumid and ſhorter, were ſo contracted, that ſhe could not ſtretch out her Legs ſtraight.

Concerning the caſe of this ſick Noble Lady, it may be demanded, wherefore upon the firſt coming of the Fit, no throwing about of the Body or Limbs, as is wont in moſt Convulſive or Epileptical people, but only continued Spaſms or Convulſions variouſly tranſlated from one part to another, and ſo others, did ariſe? For the ſolution of this, we ſay, that the Spaſmodick matter is not only heaped up in the Brain and Nerves, but alſo in the Muſcles themſelves, and grows to the Spirits inhabiting the Tendons: And as that matter is tenacious, and the Spirits weak, and unable for the ſtriking off quickly or eaſily ſuch a Copula; therefore as often as theſe being irritated, do leap out of the Tendons into the fleſh, the Muſcles being firſt poſſeſt, they cauſe ſtrong and long Contractions; in the mean-time, other Muſcles, eſpecially their Antagoniſts or oppoſites, being hindred and bound up from motion, until the Convulſions of the former are remitted; hence the Members, however convulſed, are not moved out of their place, becauſe the moving or carrying of the Body, or any Members, is not performed but by the help or duty of many Muſcles, whilſt ſome of them either rightly cooperate with others, or at leaſt obey them, to wit, ſo that ſome reſpective Muſcles, obſerving due cooperation, are contracted at once, then thoſe being looſned, the contraction of others immediately ſucceeds. But if they which are unequal and unlike, are at once contracted and ſtrongly convulſed, and ſo continue long, ſo that other Muſcles in the mean time cannot be contracted, there will be a neceſſity for the members bent or extended here and there, to remain as they are wholly ſtiff. But that the preſent Convulſions were always remitted by the blowing the ſmoke of Tabaco up her Noſe, the reaſon is, becauſe the region or ſome part of the bodily Soul being vehemently affected, if by chance a new paſſion equally violent be brought upon another part, the firſt is preſently aboliſhed or ceaſes: For in truth, it appears by conſtant obſervation, where-ever the greater or freſher trouble is, that thither greater plenty of Spirits preſently flock and make a tumult: wherefore any new irritation being excited in the Brain or its Meninges, whatſoever others were begun outwardly among the Muſcles, immediately vaniſh or are obſcured; then as ſoon as this freſh trouble is paſſed over, Convulſions outwardly ariſe forthwith again, but in other parts where more heaps of Spaſmodick matter lye not yet conſumed. But that long continued Spaſms do ariſe, either by reaſon of the Spirits being burdened with a more tenacious Copula, or by reaſon of the Tendons being obſtructed with a viſcous or tartareous matter from either or both, it appears from hence, becauſe this diſeaſe increaſing (as in the caſe of this Noble Lady) the Tendons are at length ſo ſhortned by the more plentiful heaping up of the morbifick matter, that they become ſtiff and ſhorter, and for that reaſon they hardly or not at all grant any place to the Spirits for the conſtant performing of the motive function.

Thus much for the Muſculary Motion, both natural and convulſive, and the rea-

ſons of both; which we have proved with what diligence we were able, and by Anatomical Experiments: But if any one ſhall object, that they are not very firm, becauſe we have noted in the cutting up of live Creatures, that the Heart and Muſcles of Reſpiration and the fleſhy Pannicle, after that the Nerves and Arteries are cut away, do continue for ſome time their turns of Contraction and Relaxation, whence it is argued, againſt our Hypotheſis, that their motions do not depend upon the conſtant influx of the blood and animal Spirits; it will be plain to return this Anſwer, That in thoſe about to dye, it ſometimes happens ſo, becauſe the Soul being then diſtracted and drawing near to diſſolution, all the implanted Spirits at once being cut off from the commerce of thoſe influencing or flowing in, do of their own accord exert themſelves, and perform (as long as they are able) their wonted motions; which being continued for a little ſpace only, need not the ſubſidy or aſſiſtance of freſh forces, becauſe the veterane, till they are quite worn out, perform their wonted tasks; yea alſo the old ſanguineous Copula, till it be wholly conſumed, receives and lets go their embraces with a conſtant change: But this more rarely ſucceeds in other Muſcles ſubject to the Empire of the Appetite, and wont only to be exerciſed as occaſion ſerved.

Moreover, as we have affirmed, that the Inſtinct for the performing of Motions is brought altogether through the Nerves from the Head to the Muſcle, and as every Trunk of the ſame Nerve, being oftentimes broken into many ſhoots, variouſly diſtributing them, ſends it to many deſtinated Muſcles, it may very well be doubted, how the animal Spirits, conveying the Symbol of the motion to be performed with a certain choice, do actuate only theſe or thoſe branches apart from other branches of the ſame, and do not indifferently enter all the branches or ſhoots of the ſame; to wit, as the blood paſſes through the Trunk of the Artery, and all its ramifications equally. The moſt Learned *Regius*, that he might ſolve this knot, ſuppoſes in the Nerves ſome little doors, like to thoſe which are found in muſical Organs, the apertures whereof admit the Spirits to theſe or thoſe parts eſpecially, the reſt being ſhut up. But he ought to have ſhewn, if not the little doors themſelves, yet at leaſt by what inſtinct and by whoſe direction ſometimes theſe, ſometimes thoſe are locked up, and others opened. But in truth, this may rather be ſaid, that all the ſhoots of the Nerves and leſſer branches remain diſtinct and ſingular among themſelves from the parts to which they are inſerted, even to their beginnings; ſo that a peculiar tract of the Spirits or way of paſſage lyes open, from the Brain and its medullary Appendix, to every Muſcle and nervous part; for in truth, although the Nerves, according to their beginnings, may ſeem to ariſe from the greater Trunks; yet it will eaſily appear, if you ſhall open the trunk and thoſe branches, that in them many little Nerves, only like hairs, for the ſake of a better conduct, are collected together in the ſame bundle; yea, the coverings being ſeparated, you may follow oftentimes the little Nervulets, and thoſe ſingle to the reſpective parts and members, to which they are deſtinated.

But in the mean time, although there be ſingular paſſages or chanels of the animal Spirits of moſt Nerves, diſtinct among themſelves; yet ſome do variouſly communicate with others through the branches and ſhoots ſent on either ſide; which indeed ought to be ſo made, that when many Nerves together, are required to ſome motion of a Muſcle equally, all theſe, by reaſon of the commerce mutually had between themſelves, might conſpire in the ſame action; hence, in ſome motions of the members, as in the ſtriking of a Harp or Lute and other complicated actions, many Muſcles cooperate with admirable celerity; ſo that, although many be imployed at once, they perform their task ſeverally without any confuſion. Beſides, there is need for the Nerves to communicate mutually among themſelves, becauſe of the Sympathetical motions of the members and of ſome of the parts, for neither for any other cauſe is the Nerve of the Diaphragma inſerted into the brachial branches, or thoſe belonging to the Arms, than that the exerciſe of living Creatures, eſpecially in running or flying, might be proportionate to the tenour of Reſpiration. Hence it alſo proceeds, that in any paſſion, the Præcordia being bound up or dilated, the countenance and aſpect of the face, yea and the geſtures of the hands and members are pathetically figured. We have propoſed ſufficient Inſtances of this ſort in our particular Hiſtory of the Nerves, ſo that we need not here add any thing more.

What remains for the illuſtrating our Myology or Tract of the Muſcles, we have taken care to have added, *viz.* four Figures, which may repreſent to the life both the exteriour and interiour true and natural faces or appearances both of a ſimple and compounded Muſcle.

THE

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Fig. I.

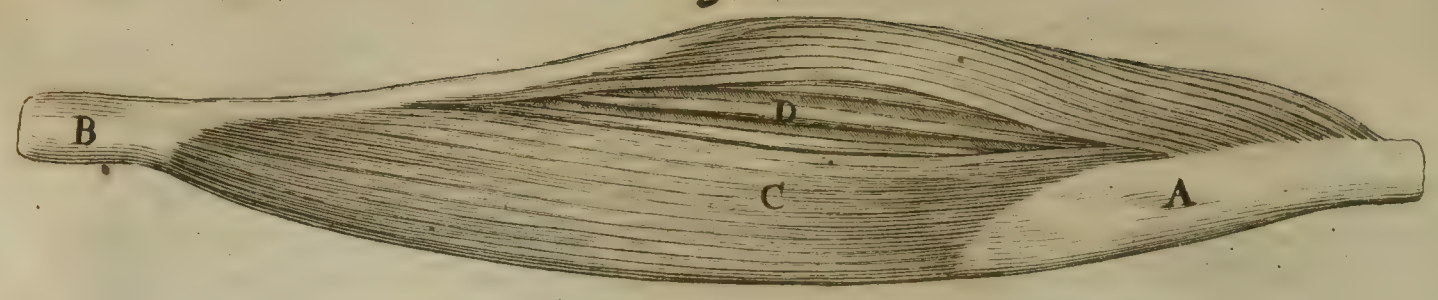
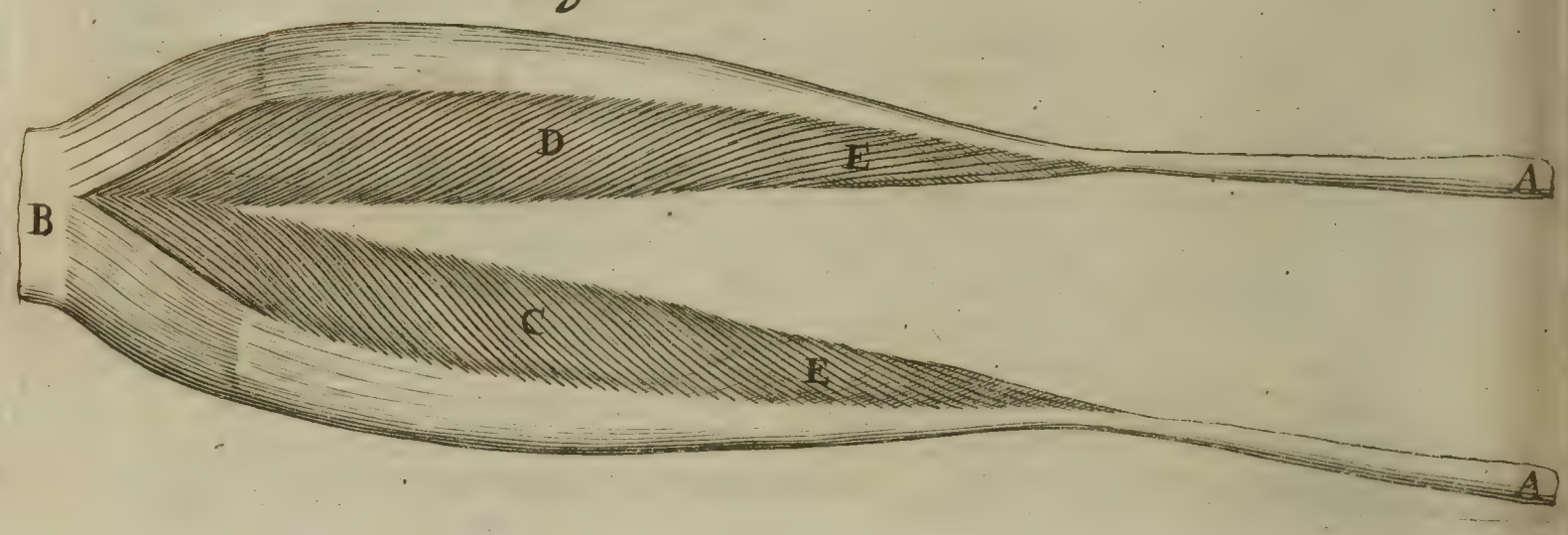


Fig. II.



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Fig. III.

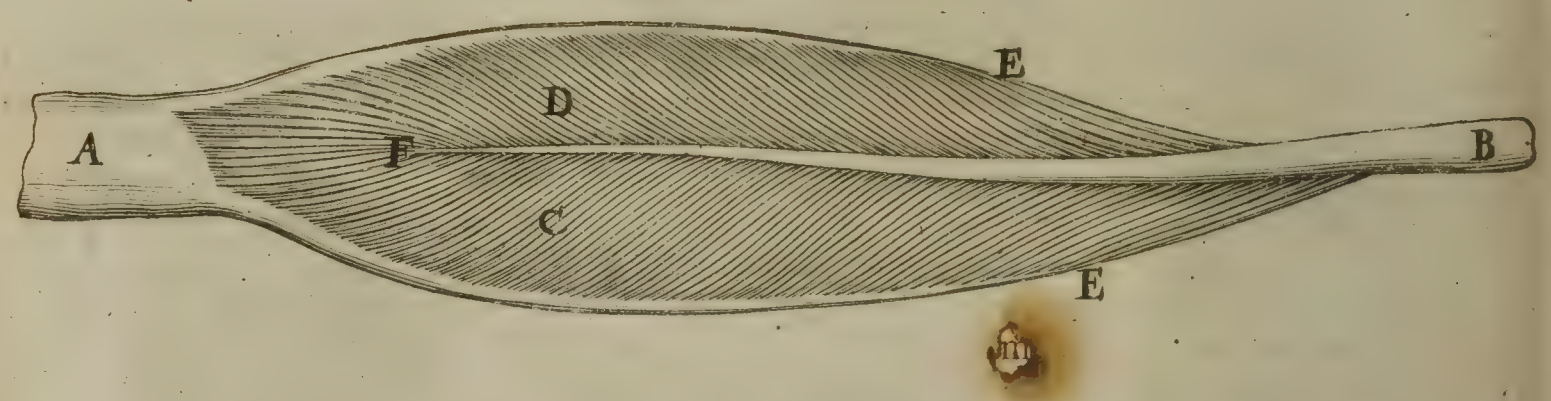
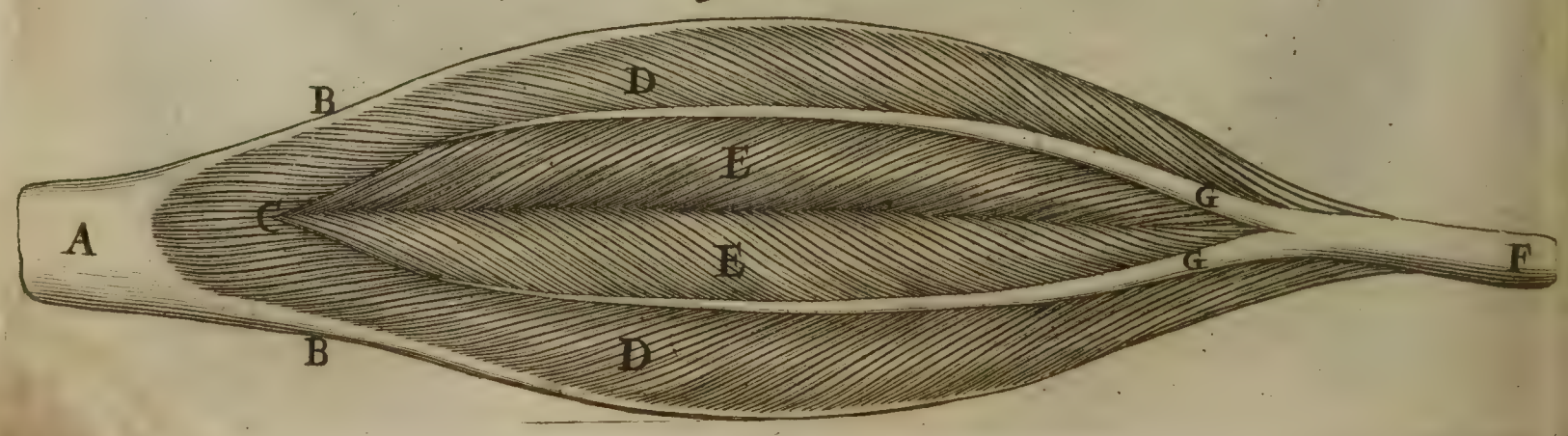


Fig. IV.



The Explication of the Figures.

The Firſt Figure

Shews a ſimple regular Muſcle, deſcribed according to its natural appearance, in the Belly of which the fleſhy Fibres being opened, are diduced one from another, that the membranaceous Fibrils may be the better beheld.

A. *The right Tendon.*
B. *The left oppoſite Tendon.*
C. *The fleſhy Belly; all the fleſhy Fibres of which lye one by another equal and parallel, but in even and oblique Angles between either Tendon.*
D. *The aperture of the fleſhy Fibres, which being drawn aſide, the membranaceous Fibrils, thickly croſſing them, appear.*

The Second Figure

Shews a ſimple Muſcle cleft in the middle, after the Tendon being cut off, and portions of it pulled away, that the interiour ſeries of the fleſhy Fibres, or their commixtures or mingling with the Tendons, may appear.

AA. *The right Tendon being placed above, both portions of which divided, do in ſome meaſure appear.*
BB. *The left oppoſite Tendon placed below, either portions of which divided, lye hid for the moſt part under the Fleſh, thoſe towards the edges being only conſpicuous.*
CD. *Portions of the fleſhy Belly divided and ſeparated, which before (this being laid upon that) did cohere, in either of which all the fleſhy Fibres proceed equally, and in like manner obliquely from one Tendon to another.*
E. *Some membranaceous Fibrils repreſented, thickly croſſing the fleſhy Fibres.*

The Third Figure

Exhibits a certain Muſcle leſs compounded, to whoſe two fleſhy Bellies two compounded Tendons alſo (equal to four ſimple ones) are deſtinated.

A. *The exteriour compounded Tendon, embracing either ſide of the fleſhy Fibres, which being almoſt only conſpicuous on the edges, lyes hid for the moſt part under the Fleſh.*
B. *The interiour compounded Tendon, entring into the middle of the Fleſh, which receives on both ſides the fleſhy Fibres, ſent from either ſide of the exteriour Tendon.*
C. *The firſt Belly of the fleſhy Fibres, all whoſe equal and parallel Fibres lye between the oppoſite ſides of the Tendons in oblique Angles and equal.*
D. *The ſecond Belly of the fleſhy Fibres, all whoſe Fibres being in like manner formed, are beheld in the ſame as in the other Belly.*
EE. *Both extremities of the exteriour compounded Tendon.*
F. *The extremity or end of the interiour compounded Tendon, the like to the other being oppoſite, at an equal diſtance from the end of the Muſcle.*

The Fourth Figure

Shews a regular compounded Muſcle, divided and opened in the middle, ſo that the interiour face of either Belly may appear.

A. *The exteriour compounded Tendon cleft into four parts.*
BB. *Portions of one ſide of the divided Tendon ſeparated from the other.*
C. *Portions near ſited, of the other ſide of the divided Tendon, which for the greateſt part lye hid under the fleſh.*
DD. *The fleſh of one Belly alſo divided, and ſeparated one far from another.*
EE. *The fleſh of the other Belly alſo divided, and placed near one another.*
F. *The interiour compounded Tendon entring the middle of the Fleſh.*
GG. *Portions of the ſame Tendon divided, and with portions of the Bellies, which they receive, ſeparated apart.*

THE ANATOMY OF THE BRAIN.

The Authors Epiſtle Dedicatory to his Grace Gilbert *Archbiſhop of* Canterbury, *&c.*

Moſt Honourable Prelate,

ONCE more your *Sidley* Profeſſor and your Servant (the more happy Title) flings himſelf at Your feet, with this only Ambition, that he might render ſomething of Thanks for Your Kindneſs and benefits, and that our Labours might chuſe ſuch a Patron, that might give Credit to the Author. But I fear, leſt by my repeated Duty I may ſeem troubleſom, and no leſs in acknowledging Your Benefits, than others in ſuing for them: But ſo great is my Gratitude, and ſo exceeding is Your good Nature, that they cannot be crowded into a little compaſs, much leſs wearied out or drawn dry.

But there is another Reaſon, which if it doth not command what I do, may at leaſt excuſe and defend it. For when I had reſolved to unlock the ſecret places of Mans Mind, and to look into the living and breathing Chapel of the Deity (as far as our weakneſs was able) I thought it not lawful to make uſe of the Favours and Patronage of a leſs Perſon, neither perhaps would it have become me. For You indeed are He, who moſt happily preſides (both by Merit and Authority) over all our Temples and Sacred Things. Therefore after I had ſlain ſo many Victims, whole Hecatombs almoſt of all Animals, in the Anatomical Court, I could not have thought them rightly offered, unleſs they had been brought to the moſt holy Altar of Your Grace.

I am not ignorant, how great the labour is that I undertake: For it hath been a long while accounted as a certain Myſtery and School-houſe of Atheiſm to ſearch into Nature, as if whatever Reaſons we grant to Philoſophy, ſhould derogate from Religion, and all that ſhould be attributed to ſecond Cauſes, did take away from the firſt.

But truly, he doth too much abuſe the Name of Philoſophy, who conſiders the wheels, curious frame, ſetting together, ſmall pins, and all the make and proviſion of a Clock, by which invented Machine the courſe of the Time, the orders of the Months, the changes of the Planets, the flowing and ebbing of the Sea, and other things of that kind, may be exactly known and meaſured, if that at length, when by this his ſearch and conſi-

deration,

deration, he hath profited himſelf ſo much, he ſhould not acknowledge the Artiſt, to whoſe Labour and Wit he owes all thoſe things.

I am ſure I am of another mind and opinion, who look into the Pandects of Nature, as into another Table of the Divine Word, and the greater Bible: For indeed, in either Volume there is no high point, which requires not the care, or refuſes the induſtry of an Interpreter; there is no Page certainly which ſhews not the Author, and his Power, Goodneſs, Truſt, and Wiſdom.

In the mean time, there is no right Weigher of things that can lay to our charge as a fault, that we have ſtudied theſe Rolls of Nature, becauſe ſome Atheiſts may be made thereby; which may be objected to the ſtudies of Divines in Sacred Letters, that from their proviſion Hereticks have taken their Arguments and Opinions, and turned them againſt them and Godlineſs.

That I may deal freely, whoever profeſſes Philoſophy, and doth not think rightly of God, I do judge him not only to have ſhaken hands with Religion, but alſo with Reaſon, and that he hath at once put off Philoſophy as well as Chriſtianity. Therefore I deſire, that all mine may be tryed and approved, no leſs by the demonſtration of Piety and Canons of the Church, than by the Rule of Experience and Knowledge, to which I keep: Neither do I intreat and reſpect only the *Mecænas* of humane Arts, but alſo the Primate and chief of Divine, whilſt I openly profeſs my ſelf, with all due obſervance,

YOUR GRACES

Moſt humble and obliged Servant,

THO. WILLIS.

THE

The Preface to the Reader.

THE Romans ſometimes promiſed to themſelves an Empire, an Eternity by the happy Augury of an humane Head being turned out of the Glebe; neither could they perſwade themſelves, that the Capitol ſhould be the Head of the World, unleſs it had been built upon the Skull of a Man. I do not think of Empires in Arts, nor do I promiſe to my ſelf Triumphs by overcoming the World of Letters: But in the mean time, I had wholly fruſtrated thoſe Illuſtrious Documents I had long ſince learned, unleſs with thoſe Auſpices I had laboured in Philoſophy, eſpecially the Natural.

For the Province, which I hold in this Academy, requiring that I ſhould Comment on the Offices of the Senſes, both external and alſo internal, and of the Faculties and Affections of the Soul, as alſo of the Organs and various proviſions of all theſe; I had thought of ſome rational Arguments for that purpoſe, and from the appearances raiſed ſome not unlikely Hypotheſes, which (as uſes to be in theſe kind of buſineſſes) at length accrued into a certain Syſtem of Art and frame of Doctrine. But when at laſt the force of Invention being ſpent, I had handled each again, and brought them to a ſeverer teſt, I ſeemed to my ſelf, like a Painter, that had delineated the Head of a Man, not after the form of a Maſter, but at the will of a bold Fancy and Pencil, and had followed not that which was moſt true, but what was moſt convenient, and what was rather deſired than what was known. Thinking on theſe things ſeriouſly with my ſelf, I awaked at length ſad, as one out of a pleaſant dream; to wit, I was aſhamed that I had been ſo eaſie hitherto, and that I had drawn out for my ſelf and Auditors a certain Poetical Philoſophy and Phyſick neatly wrought with Novity and Conjectures, and had made a Fucus *as it were with deceits and incantations for either of us.*

Wherefore all delay being laid aſide, I determined with my ſelf ſeriouſly to enter preſently upon a new courſe, and to rely on this one thing, not to pin my faith on the received Opinions of others, nor on the ſuſpicions and gueſſes of my own mind, but for the future to believe Nature and ocular demonſtrations: Therefore thenceforward I betook my ſelf wholly to the ſtudy of Anatomy: and as I did chiefly inquire into the offices and uſes of the Brain and its nervous Appendix, I addicted my ſelf to the opening of Heads eſpecially, and of every kind, and to inſpect as much as I was able frequently and ſeriouſly the Contents; that after the figures, ſites, proceſſes of the whole and ſingular parts ſhould be conſidered with their other bodies, reſpects, and habits, ſome truth might at length be drawn forth concerning the exerciſe, defects, and irregularities of the Animal Government; and ſo a firm and ſtable Baſis might be laid, on which not only a more certain Phyſiologie than I had gained in the Schools, but what I had long thought upon, the Pathologie of the Brain and nervous ſtock, might be built.

But for the more accurate performing this work, as I had not leiſure, and perhaps not wit enough of my ſelf, I was not aſhamed to require the help of others. And here I made uſe of the Labours of the moſt Learned Phyſician and highly skilful Anatomiſt, Doctor Richard Lower, *for my help and Companion; the edge of whoſe Knife and Wit I willingly acknowledge to have been an help to me for the better ſearching out both the frame and offices of before hidden Bodies. Wherefore having got this help and Companion, no day almoſt paſt over without ſome Anatomical adminiſtration; ſo that in a ſhort ſpace there was nothing of the Brain, and its Appendix within the Skull, that ſeemed not plainly detected, and intimately beheld by us. After this, when we entred upon a far more difficult task,* viz. *the Anatomy of the Nerves, then very much appeared*

peared the plainly to be admired skill of this Man, as also his indefatigable Industry, and unwearied Labour: For having prosecuted, with a most exact search, all the divarications, wandring on every side of the Nerve, how minute or small soever, and immersed, and variously infolded within other Bodies, and so turning over the Labyrinths of the Branches, and shoots of every pair, far and near diffused, he drew out with his own hand the Schemes, Images, or Draughts of them, and also of many passages of the Blood, as they appear in this Tract; which indeed, that they might be faithfully and most exactly shewn, without any falsity or errour, he caused, that no Table might contain scarce any line or the most light passage, whose conformation and exact habitude he had not found proved by the marks or inspection of many Animals for that purpose killed.

Besides the helps brought me by his most skilful dissecting hand, it becomes me not to hide, how much besides I did receive from these most famous Men, Dr. Thomas Millington *Doctor in Physick, and* Dr. Chr. Wren *Doctor of Laws, and* Savill *Professor of Astronomy; both which were wont frequently to be present at our Dissections, and to confer and reason about the uses of the Parts. Besides, the former most Learned Man, to whom I from day to day proposed privately my Conjectures and Observations, often confirmed me by his Suffrage, being uncertain in my mind, and not trusting to my own opinion. But the other most renowned Man,* Dr. Wren, *was pleased out of his singular humanity, wherewith he abounds, to delineate with his own most skilful hands many Figures of the Brain and Skull, whereby the work might be more exact.*

But although instructed by these helps, and as it were hem'd in by the plentiful assistances of these Illustrious Men, I come forth on the Stage, I presume I shall not be however safe from calumny, and free from blame and most just reprehension: because here is inquired into the recesses and most inward dens of the Brain, and its depending parts as it were shut and sealed up; concerning the certain uses of which, scarce any thing may be brought forth, but that, as it may be published and shewn, for the Judgments of the more Learned, so it may be carpt at and torn by the opprobries of detractors. In other parts, where matters appear to the Senses, we do not so easily run upon errours. For in most of the Viscera and Vessels, the Contents and contained humors, as also their passages within the larger Cavities of the containing parts, are discerned by the sight: But in the Brain and Nerves, neither the rushings on or impressions, viz. *the Animal Spirits themselves, nor their tracts or footsteps, can any ways be seen. Wherefore to explicate the uses of the Brain, seems as difficult a task as to paint the Soul, of which it is commonly said, That it understands all things but it self: for in truth, the unwearied labour of the Brain beholds or searches the hidden places of other Bodies, in the mean time the œconomy or regiment of its own Family and Kingdom being wholly hid and unknown.*

But what we profess to be performed by us in the following Tract, and hope for the future from the help or labour of others, is chiefly this; to wit, that we have not rashly described the parts themselves, of which the Anatomy is instituted, but that we have with diligent care and great trust collected the various appearances and Arguments of Observations by a manifold Dissection. Which things, if you shall delineate out of those Sentences and granted Decrees, as it were to a Mathematical Rule, and from thence would collect a Theory, as yet lame, and that may not appear absolute in all its numbers, no doubt but that a longer time, and the getting of more Observations may give it a more perfect form, that Antiquity may not have said altogether in vain, That Minerva *was born from the Brain,* Vulcan *with his Instruments playing the Midwife: For either by this way,* viz. *by Wounds and Death, by Anatomy, and a Cæsarean Birth, Truth will be brought to Light, or for ever lye hid.*

THE

THE ANATOMY OF THE BRAIN.

CHAP. I.

The Method or Anatomical Adminiſtration of Diſſecting the Brain is propoſed.

AMong the various parts of an animated Body, which are ſubject to Anatomical diſquiſition, none is preſumed to be eaſier or better known than the Brain; yet in the mean time, there is none leſs or more imperfectly underſtood. All of it that appears, and is commonly deſcribed in the forepart or forehead, is beheld almoſt at a ſight or two after ſome rude cutting up; but if you ſeek what lyes hid in the receſſes for that end, new boſoms and productions of Bodies, before hid, are every where laid open: yea the parts of the Brain it ſelf are ſo complicated and involved, and their reſpects and habitudes to one another ſo hard to be extricated, that it may ſeem a more hard task to inſtitute its perfect Anatomy, than to delineate on a plain, the flexions and Meanders of ſome Labyrinth: Becauſe, as we are not able to eſtimate the meaſure or to paint forth the pattern or draught of the frame of this, ſo neither of that, unleſs the bulk or ſubſtance of the ſubject be firſt ſearched to the bottom, and its frame broken into pieces. Hence it came to paſs, that the old Anatomiſts in diſſecting the Brain, not ſufficiently attending what was placed firſt, what ſecond, and what after that in the order of Nature, cut its Globe as it were into ſlices or parts, and the Phænomena ariſing by chance from ſuch a diſſection, they eaſily eſteemed for true parts of the Brain; when yet in the mean time, by others from a diſſection otherwiſe made, the parts and proceſſes of it appear far different from the former. The reaſon of which is, becauſe the ſubſtance or frame of the Brain and its Appendix lyes ſo within the Skull, that there are many ſwellings or tuberous riſings, with ſeveral tails or little feet compacted together: all which, although diſtinct one from another, and are endued with figures diverſly expanded; yet they, that they may be contained in a leſſer room, are thruſt as it were into the ſame Globe, and ſo complicated among themſelves, that it is a hard thing to find out where the beginning and end of the Brain, as alſo where the limits and partitions of the near adjoyning parts do remain; further, that the ſeveral parts of the Encephalon ſo complicated, may retain their ſite, nor preſently being looſned one from another, may ſpring forth, they are knit together into due foldings, with Fibres and Membranes ſtretched out from part to part. And as often as the ſubſtance or bulk of the Brain ſo conglobated or rolled together is cut, there is as often a neceſſity that the ſlips being cut, the portions of divers parts cleaving together, are carried away with them. Wherefore that a true and genuine deſcription of the Brain might be ſhewed before its ſubſtance and continuity is diſſolved, before all things its whole frame or ſubſtance ought to be explicated, and the knitting of the Membranes being wholly looſned, the ſeveral parts ought to be turned over and ſtretched forth into their proper dimenſions. By what means theſe things may be done, and by what

Method the diſſection or Anatomical adminiſtration of the Brain may be beſt performed, ought here in the firſt place to be ſhewn; then theſe things being firſt done, we will more largely deliver the Deſcription of the Brain, together with the uſe and action of its ſeveral parts.

That the perfect knowledge of the Brain and its parts may be gained, it is neceſſary not only to diſſect and look into mens Heads, but all other kind of living Creatures heads: for beſides, that the humane Heads or Bodies are not ſo readily to be had, that one may from day to day behold the Brain and its frame, and carefully conſider the ſituation of the parts, and ſearch one after another their reſpects, habitudes, and dependencies; beſides alſo, the immenſe bulk of an humane Head is in it ſelf an hindrance, whereby its moſt intricate frame and various receſſes and Appendices are the leſs accurately diſcerned and inveſtigated: all which being reduced into an Epitomy, are plainly repreſented more commodiouſly in the diſſection of Beaſts. Wherefore when the form and compoſition of the Brain in a Dog, Calf, Sheep, Hog, and many other four-footed beaſts, were little different (the magnitude only excepted) from the figure of the ſame, and the diſpoſition of the parts, in a man, I was the more ſatisfied to compoſe a certain Anatomy of the Brain by the frequent diſſection of all ſorts of living Creatures. And in this imployment, for that I ſhall ſhew the communities and differences which the ſubjected parts obtain in various Animals, compared among themſelves, and with Man; certainly from ſuch a compared Anatomy, not only the faculties and uſes of every Organ, but the impreſſions, influences, and ſecret ways of working of the ſenſitive Soul it ſelf will be diſcovered. Concerning the Heads of living Creatures, in the diſſection of which it happened for us chiefly to be exerciſed, it was obſerved, as to the chief parts of the Head, that there was a notable Analogy between Man and four-footed Beaſts, alſo between Birds and Fiſhes: For when the firſt Inhabitants of the new-made World were produced, as one day brought forth Fowl and Fiſhes at once, another in like manner Man and four-footed Beaſts; ſo there is in either twin ſpecies a like form of the Brain; but between that Child of the former, and this of the following day, there is found a great difference as to thoſe parts. For as much therefore as Men and four-footed Beaſts have got more perfect Brains, and more alike among themſelves, we have ordered our Obſervations from their Inſpection: Then afterwards we ſhall deliver the Anatomy of the Brain in Fowl and Fiſhes. And here firſt concerning the Heads of Men and four-footed Beaſts, (as we hinted but now) we will propoſe a Method of Diſſection it ſelf, or of Anatomical Adminiſtration, and will at once recite all the parts one after another, and as it were in a compendious Catalogue; then we will by and by more largely draw out the Particles of the Brain and of its Appendix, ſo ſhadowed, in a ſhort Table, and will deſign their uſes and actions for the exerciſe of every faculty.

When therefore we had in our hands the Head of a Man, or Dog, Calf, or Sheep, its more outward coverings were taken off; concerning which, as they are well enough known, we are not at all ſolicitous: then the covering of the Skull being divided by a Saw or Inſtrument, and taken away, on every ſide the bones are broken off with a pair of Sciſſers or a Penknife to the Baſis of the Skull, that ſo the Contents might, as much as may be, be all made plain or open to the Spectators. What therefore comes firſt in view is the hard Meninx including all the reſt with a common covering. This Membrane outwardly and above is knit to the Skull in divers places, eſpecially about the Sutures; but indeed about the foot or Baſis it moſt ſtrictly cleaves to the bones, ſo that it cannot eaſily be pulled away. Inwardly (or in its hollow ſuperficies) it is lax and looſe enough, unleſs that nigh all its boſoms by the inſertions of the Veins, and in the Baſis of the Skull by the Arteries and the Nerves it is tyed to the *Pia Mater*.

This ſame Membrane between the *Interſtitia* or diviſion of the Brain, and beſides of the Cerebel it ſelf inſinuating it ſelf deeply on one ſide, and riſing up again on the other, leaves ſome duplicatures or infoldings, in which, being ſhut up above by the increaſe of the ſame Membrane, Cavities, which they commonly call Boſoms, are formed: to wit, by this means, almoſt the three firſt boſoms are conſtituted; but the fourth is a ſmooth and longiſh, and alſo hollow proceſs of the ſame Membrane, which is ſent through the *Interſtitia* of the Brain, nigh the end of the callous body, even to the pineal *Glandula*. The Cavities of the greater Boſoms are ſevered in many places, as it were into little Cells; as it ſeems for that end, that the blood

paſſing

paſſing ſo through the various turnings in thoſe ends, may be hindred from a more rapid motion.

Beſides, this Meninx or Film of the Brain admits two Arteries from either ſide, one conjugation of which ariſes not far from the Carotick Arteries through the holes of the Cuniform bone, but the other from the bone of the Forehead: all which indeed being diffuſed through the exteriour ſuperficies of the Membrane, water it; but are terminated, partly in the Skull, eſpecially nigh the Sutures, whither they convey the blood, and partly in the boſoms, where, what is ſuperfluous is laid up. Moreover, theſe Arteries perforate the hard Meninge in ſeveral places on the top of the Brain (as *Webſer* obſerves) and impart ſome ſhoots to the *Pia Mater*. Laſtly, the exteriour ſuperficies of this Meninge is no where planted with ſo many ſhoots of Veins as Arteries; but from its four Boſoms (which are the veinous Receptacles of the blood) many Veins go out through the interiour ſuperficies of this Membrane, which being inſerted in the *Pia Mater*, are preſently diſperſed through its whole compaſs, and the ſame ſliding down on every ſide from the boſoms, meet every where the Arteries aſcending from the Baſis of the Head, and being intermingled with them, conſtitute the manifold infoldings of the Veſſels.

That theſe may be the better beheld, after the Arteries are ſufficiently noted, let the hard Meninx be cut round near the border of the broken Skull; then let whatever of it ſerves for a covering and partition to the Brain and Cerebel, be lifted up, that the goings out of the Veſſels, *viz.* the Veins and their diſtributions into the *Pia Mater* may be conſidered; which being afterwards broken aſunder, let the Membrane with its boſoms be wholly taken away; but the reliques of this Membrane, which ſtick to the bones at the bottom of the Skull, ſhould be ſeparated; ſo that the whole frame or ſubſtance of the Brain and its Appendix may be ſomewhat elevated, and moved here and there, be every where conſpicuous, and at length taken from the Skull. But that theſe things may be performed, you muſt begin from the anterior or fore part, where the bone of the Forehead ſeparates it.

Therefore if the prow of the Brain, hid under this bone, be a little lifted up, the mammillary proceſſes come preſently in ſight, together with the ſmelling Nerves hanging to them; which being diſſected near the inſertion, there will appear an hollowneſs in either proceſs. Theſe are large and round, alſo full of clear water in Calves: but in either ſmelling Nerve a manifeſt Cavity is found continued on either ſide to the anterior Ventricles of the Brain, to which if a Pipe be put and blown into, preſently the whole ſubſtance of the Brain will ſwell.

Next the ſmelling Nerves about the Cocks comb two ſmall Arteries are ſeen to ariſe from the Skull, and to be carried towards the *Interſtitium* of the Brain, which in truth are branches of the Carotides, which are knit to the dilated Comb before, and from thence are ſeen to be reflected to the anterior Brain.

Theſe Veſſels being there diſſected, the coming together and going out of the Optick Nerves follow, the trunk of which being cut off a little lower, the Tunnel, and out of both its ſides the Arteries called Carotides, ariſing out of the Cuniform-bone, do appear; which are more clearly beheld, if the Brain be lifted up. Theſe alſo being cut off, and the brain farther bent back, the moving Nerves of the Eyes preſently ſhew themſelves; and ſo from thence the other pairs of Nerves follow in order, that one pair of them being cut off, and the brain with its Appendix more lifted up, the next is ſtill obvious to thoſe beholding it, till all the Nerves ariſing within the Skull, and alſo the Arteries, both the Carotides, and the Vertebral being at length cut off, the whole frame of the Head may be taken out of the Skull.

But (that theſe Veſſels may be deſcribed in the ſame order as they are met with in the cutting them up) two ſmall Nerves follow after thoſe moving Nerves of the Eyes, which, for a reaſon hereafter rendred, we call Pathetick. Theſe Nerves higher than the reſt, ariſing behind two round Prominences called *Nates* and *Teſtes*, (the Buttocks and Stones of the Brain) and bending down forward, and entring for a little ſpace under the *dura Mater*, then coming out through the ſame hole, together with the former, from the Skull, are propagated into the ſight of the Eye. This pair is called by *Fallopius* the eighth, by us the fourth.

Beneath theſe little Nerves, from both ſides of the annulary protuberance, (which being ſent from the Cerebel compaſſes the oblong Marrow) two Nerves of noted magnitude ariſe, which, after they have paſſed through the *dura Mater*, ſend forth another notable branch on either ſide ſtraight down without the Skull, the other

branch, by a longer tract, paſſing through both ſides the Skull near the Turky Chair. Theſe Nerves (as is ſhewn afterwards) having gotten a larger Province, are inlarged in the Palate, the parts of the Mouth and Face, and alſo their branches in the Noſe and Eyes, yea they impart roots to the intercoſtal Nerve. We call this pair the fifth, commonly eſteemed the third.

Nigh to the beginning of theſe, out of the loweſt foot of the oblong Marrow or Pith, two leſſer Nerves, endued with a ſingle trunk, ariſe, which being dilated forward, and preſently entring under the *dura Mater*, come out of the ſame hole with the moving Nerves of the Eyes, and are all carried into the balls of the Eyes. This pair is called by us the ſixth.

Next to theſe Nerves follow the auditory or hearing pair, which indeed ariſes higher from the ſides of the oblong Marrow, in what part the Cerebel is hanged to it, *viz.* nigh the leſſer annulary proceſs; from whence it is immediately carried with a double proceſs into the hole of the ſtony Bone: one of its branches is harder, ſerving chiefly for motion; the other altogether medullary and ſofter, as it were only deſtinated to ſenſe.

A little lower ariſes the wandring pair, which is commonly called the ſixth. This ſeems to be made of many Nerves, many of which ariſe together; and to them comes another, endued with a greater trunk, which being brought from the end of the oblong Marrow, yea beyond this, out of the ſpinal Marrow, is united with the former. And ſo all being made like a bundle of Nerves, go out through the hole of the hinder part of the Head; through which alſo goes out the greater branch of the internal jugular Vein. This is by us called the eighth pair.

Under the wandring pair, almoſt out of the Baſis of the oblong Marrow, another pair ariſes, conſiſting alſo of many Fibres, which going ſtraight down, and being preſently immerſed in the *dura Mater*, comes forth again through a peculiar hole out of the Skull; then either Nerve, being inoculated into the trunk of the wandring pair, is preſently bended back towards the Tongue. In a man, a peculiar protuberance grows above the oblong Marrow, out of which the beginning of this Nerve proceeds. This we call the ninth pair.

Below this, in the loweſt part of the hinder part of the Head, out of the ſides of the oblong Marrow, where it is about to go into the ſpinal, another pair, conſiſting alſo of many Fibres, ariſes; which tending towards the ſpinal Marrow, enters the *dura Mater* at the ſame place where the vertebral Artery aſcends into the Brain; yet it ariſes out of the boſoms of the bones, but below the firſt Vertebra or Joynt, from whence it is carried into the Muſcles of the hinder part of the Neck, ſo that it is doubtful, whether this pair ought to be called the laſt of the Skull, or the firſt of the Vertebrals.

When theſe parts, *viz.* the aforeſaid Nerves and Arteries, both the Carotides and the Vertebrals, with the jugular Veins (by which the Encephalon is faſtned to the foot or baſis of the Skull) are cut off, and their ends ſtretched out as much as may be; either let them remain in the taken out ſubſtance or frame, whereby the beginnings of all the Nerves may be plainly noted; or the trunks of them being cut off near the roots, may be left in the holes of the Skull, whereby their goings out and diſtributions may be obſerved. The images of either Example are delineated in the firſt and ſecond Table.

The buſineſs of Diſſection being thus far brought, the reſidue of the Skull ſhews many things worthy conſideration, of which we ſhall ſpeak particularly afterwards. But firſt we ought to view throughly the taken out frame or ſubſtance of the Brain, together with its Appendix, and to examine all its appearances as they follow in the order of Diſſection.

The ſubſtance or bulk being taken out, which is of a ſomewhat round figure or ſpherical, it exhibits to the ſight in its ſuperiour and convex part the Brain and Cerebel; but the oblong Marrow, with the utmoſt borders or edges of the ſuperiour bodies, poſſeſſes almoſt all the baſis or its loweſt part. The thinner Meninx covers theſe three placed near, and the outward ſuperficies of them all; nor doth it clothe the ſame looſly, but deeply inſinuating it ſelf into all their cavities and receſſes, covers and binds them ſtrictly. And as this Membrane is every where interwoven, with the folds of the Veſſels, by its ſtretching out, it reaches the ſame to every part and portion, and ſo waters the whole with a ſufficient afflux of blood. Here we muſt conſider the Veſſels of this Membrane and its protenſion.

As

As to the former, the whole ſuperficies of the frame of the ſubject may be ſeen, covered with the infoldings of Veſſels, as it were with a net admirably variegated or flouriſhed, and its ſight or aſpect ſhews like the picture of a fruit-bearing wood; the Idea of which, the Veſſels of the Brain more aptly repreſent, and are themſelves ſeen better and more diſtinctly, if you firſt ſquirt into the Carotidick Artery ſome black liquor. The Veſſels interwoven within the thin Meninge or *Pia Mater* are Arteries and Veins. The Arteries are four, *viz.* two Carotides and two Vertebrals. Out of either ſide of the Tunnel the ends of the cut off Carotidick Arteries ſhew themſelves, the trunks of which aſcending upwards, are preſently diffuſed from either ſide into the anterior and poſterior, or fore and hinder branch. Either pair of theſe inclining one towards the other, are mutually conjoyned: moreover, the poſterior branches ſo joyned, are united with the Vertebral branches (growing together firſt into one trunk.) For the Vertebral Arteries, ariſing from the laſt hole but one of the Skull, fall at firſt divided through the ſides of the oblong Marrow; then united in its baſis, they go into a ſingle chanel, which meeting with the hinder branches of the Carotides, (as it is ſaid) it is joyned with them; and from that place of the joyning of them together, a noted branch aſcends on either ſide under the edge or rim of the Brain, which being dilated upon the ſhanks or ſtocks of the oblong Marrow, is cleft or divided into very many ſmall ſhoots like hairs, ſome of which aſcend to the Glandula's placed behind the Cerebel, but the reſt make the arterious part of the Choroeidal infoldings. The anterior branches of the Carotides, before they are united, ſend from themſelves on either ſide a noted branch, which creeping upwards like a bounding River, diſtinguiſhes either Hemiſphere of the Brain as it were into two Provinces; but after the aforeſaid branches are united, preſently departing again from one another, they are carried to the Prow of the Brain, and from thence bending back between its Hemiſpheres, they fall upon the callous body. All theſe Arteries, before and after their mutual joyning together, ſend forth ſhoots and little branches on every ſide, which do not only creep through and intimately bind about the utmoſt compaſs of its Sphere, but its Penetralia and more inward receſſes, like the young branches of Vines. The ramifications or theſe ſorts of branchings, both of the Carotides and of the Vertebrals, are ſhewn in the firſt Table, as they are found in a Man, and as in a Sheep in the ſecond Table.

Moreover, this thinner Meninx or *Pia Mater* cloathing the whole Brain and its parts, as it receives the Arteries aſcending (as hath been ſaid) from a fourfold Fountain, ſo it is ſtuffed throughout with Veins, ſent from four boſoms. Theſe Veſſels mutually meeting are complicated together, and almoſt every where conſtitute by their branches derived from both, and meeting one the other, and variouſly contorted among themſelves, the net-like or retiform infoldings; which indeed are not only outwardly in the ſuperficies, but in the diſſection, where-ever you may ſeparate one part from another, without breaking it, theſe kind of infoldings of the Veſſels are to be found. Becauſe, if you behold this frame, taken out of the Skull, collecting together the tops of all the turnings and the *Interſtitia* in this Membrane, and covering them with the joynings of the Veſſels, it will make the whole compaſs or frame of the Encephalon appear like a curious quilted ball. But if you go on to caſt abroad this Sphere, and to ſeparate the cleaving parts, knit together, of this Membrane, one from another, you will ſoon find, that this Meninx covers the gapings of the crevices or turning chaps of the Brain, binds the *Interſtitia* of either moity or Hemiſphere, draws together the hinder part of the Brain, otherwiſe being lax and hanging looſe, and compaſſing about every border of it, as it were with a Welt, knits it to the oblong Marrow: and what is the chief of all, the univerſal Cortical or ſhelly ſubſtance of the Brain (to wit, in which the animal Spirits are procreated) is covered over with this Membrane planted with moſt frequent infoldings of the Veſſels; notwithſtanding the interior ſuperficies of the Brain being ſtretched out, (which being called the Callous body, is altogether medullary and white) is not cloathed with this Membrane; but inſtead of it many foldings of Veſſels, commonly called Choroeides, are hung and as it were freely flow within its complicature. The reaſon of which is, becauſe as this part, to wit, the callous body, is rather deſigned for the Circulation than for the generation of Spirits, therefore it admits not a more plentiful influx of blood: nevertheleſs, for as much as there is need of heat, whereby the Spirits may be there more eaſily circulated, the blood being moved, within the Veſſels hanging there through the empty ſpace, might afford heat as it were from a fire kindled within a Stove. But within all the other

other receſſes of the Brain, and beſides within the folds or lappets of the Cerebel, yea and the *Interſtitia* or gaps of both theſe, and of the oblong Marrow, this Meninx inſinuates it ſelf, and inſerts the diſtributions of the Veſſels. In truth, the protenſion or out-ſtretching of this Membrane ſeems therefore the more admirable, becauſe having no where a peculiar place of its origine, it not only binds about the Head or Encephalon with a common covering, but alſo cloaths all its parts with proper coverings, and knits together their tops and proceſſes. Yea this Meninx ſeems to enjoy a manifold and diverſe original: for where-ever the gapings or *Interſtitia* of any parts or proceſſes happen, portions of this Membrane there ſpringing forth, cover them all, and gather them together, and reach to them the ramifications or branchings of the Veſſels. In a moiſter Brain this Meninx may be eaſily ſeparated, and ample and large portions of it pulled away with the fingers; which being drawn away, the inſertions of the Veſſels, into the ſubſtance of the Brain and its Appendix, every where clearly appear. Laſtly, by this means the brain being thus left naked, unclothed of its Membranes and Coverings, its make or fabrick, and the diſpoſition or order of all its parts are next ſubjected to Anatomical Inſpection.

That the Anatomy of the Brain, properly ſo called, might be rightly celebrated, I judge we ought not to proceed after the common way of Diſſection. But whenas the ſubſtance of the whole Head, taken out of the Skull, ſtands in view, firſt let the hinder partition of the brain, where it is knit to the Cerebel and oblong Marrow or Pith, the Membranes being every where cut or pulled off, be freed (as much as it may be) from its cleaving to the ſubjected parts; then it will eaſily appear, that the ſubſtance of the brain is not united to thoſe bodies, but of it ſelf is altogether free and independent of them, unleſs where it is joyned towards the ſuperficies by the knitting of the Membranes. Alſo this keel or hinder part of the brain being divided by this means from the neighbouring parts, if the fore part be bent back, the ſhanks of the oblong Marrow will appear wholly naked, and diſtinct from the brain and Cerebel (unleſs where they are in ſome places hung to it.) Moreover, when the partition of the brain, being looſned from its coheſion, is lifted up, the three Ventricles, commonly ſo called, go into one empty ſpace or mere vacuity, reſulting from the complication of the brain. Beſides, it may be obſerved, how the brain before is only united to the oblong Marrow; and that in two places of its ſhanks, as it were the tops, it is fixed; which *Fornix* ſo called, or arched Vault, is as it were a ſtring or ligament, which ariſing before, where the brain is hanging to it, is carried to its hinder border, to which it is united as it were with two ſtretched out arms, and ſo it holds together the whole frame of the brain, leſt it be rolled out into a plain, ſtill in a ſpherical figure, and firmly binds the ſame to the ſhanks of the oblong Marrow. From the knitting of the other parts of the humane brain divided and lifted upwards, whereby the vacuity reſulting from its infolding, and eſteemed for Ventricles, alſo whereby the *Fornix* or arched Vault and ſhanks of the oblong Marrow, naked and diſtinct, may be beheld, is repreſented by figure in the fourth Table.

And truly, this Poſition or Aſpect of the Brain, to wit, when its hinder border or partition, being freed from its coheſion by the Membranes to the oblong Marrow, and elevated, is bent forward, expoſes to be ſeen by the eyes themſelves, its whole frame or ſubſtance, to wit, whatever it hath without or within, or before and behind, and alſo plainly detects what its habitude and reſpect is to the other parts. The chief things of theſe I ſhall add, and in the ſame order wherein they occurred to Inſpection.

The figure of the Brain, eſpecially in a man, ſhews ſomewhat globous or ſpherical: the outward ſuperficies is on all ſides noted with chinks turning and winding like to the rollings about of the Inteſtines: each breach or involution, yea the whole circuit of it contains a twofold ſubſtance, *viz.* the Cortical or rindy, which is the outmoſt and of an Aſh-colour; and the medullary or marrowy, which lyes under it, and appears white. The brain being as it were plowed with theſe kind of rollings about, like ſo many ridges and furrows, is cleft in the middle, and parted as it were into two Hemiſpheres; yet both the moities come together, and are as it were founded in one like white ſubſtance, which covers inwardly, and as it were in Chambers or Vaults, the whole bulk of the brain. This is harder than any other portion of the brain, and as it is altogether medullary, it receives all the marrows of the circumvolutions within it ſelf, and is to them inſtead of a common baſis. In either Hemiſphere of the brain, about the fore parts, this callous body or marrowy ſubſtance, becomes more

more firm and thick by far than in any other place; and there it is on both ſides faſtned to the tops of the oblong Marrow. From thoſe tops, as it were its beginning, this medullary ſubſtance, covering over or chambering or arching the brain, is ſtretched out towards the hinder parts, and by degrees leſſens in its thickneſs: at length the outward border of this ſtretched out, is drawn together more narrowly, and more below, it is conjoyned by the knitting of the Membranes and Veſſels (as we but now mentioned) to the tail of the oblong Marrow. Beſides, for its more firm connexion, a medullary proceſs ariſes from the fore part of the callous body towards the tops of it, which ſtretching under the fiſſure or cleft of the brain, reaches to its border; to which it is united, as it were with arms bending on either ſide: which arms indeed embrace the tail of the oblong Marrow, and ſo more firmly knit to it that border of the brain.

This medullary proceſs, commonly called the *Fornix*, under its riſe or beginning, hath two white and medullary roots, either of them alike going out from the callous body, which roots nigh the tops, where the brain is hung to them, meeting together, paſs into the *Fornix* or Vault it ſelf, as if it were a broad proceſs, which ſtretches under the chamber of the brain, like a beam. Under this twofold root of the *Fornix* is laid croſs-wiſe, of the ſame magnitude, a medullary trunk, by which, like a bridge, there is a certain paſſage and communication between two proceſſes of the form of a Lentil, and chamfer'd or furrowed bodies beaming or ſhining in them. Further, from the midſt of the ſuperficies of this *Fornix*, a thin and pellucid hedge or pale is erected, which is affixed to the chanel or furrow of the callous body, almoſt along its whole paſſage. And for this reaſon, whilſt the three-ſided *Fornix* ſtretched underneath a chamber, ariſing from the complication of the brain, it diſtinguiſhed its appearing cavity as it were into three partitions, and ſo cauſed, that in it three Ventricles were repreſented.

The interior receſſes of the Brain will lye yet more clearly open, if the border, being on every ſide ſeparated and lifted up, as much as may be, from its cohering with the oblong Marrow, be cut a little further through the ſubſtance at the ſides of the ſame Marrow, to which it is united, nigh the chamfer'd bodies, and alſo the *Fornix*, being cut nigh the roots, be bent back, together with the brain; for then the frame of the brain may be wholly lifted up, turned forward, and unfolded into a plain, ſo that the whole interior ſuperficies of the callous body being ſtretched out into a broad floor, may be ſeen and handled. Where, beſides the medullary, and its moſt white ſubſtance, may be obſerved many white parallel lines, which cut the partition of the brain in right angles, as if they were certain tracts or footſteps, in which the animal Spirits travel from one Hemiſphere of the brain to the other, and return back again.

After this manner, in very many perfect four-footed Beaſts, the frame or ſubſtance of the brain was wont to be turned over, the Sphere being projected into a plain, and its interior ſuperficies to be unfolded into breadth. Alſo this kind of Method of Diſſection may be uſed in a mans brain, where the ſame Phænomena wholly occur to Anatomical obſervation. The chief difference is, that the bulk of the brain of a man, for that it is very large, and alſo far thicker, and endued with more turnings and windings; therefore it cannot be ſo eaſily and throughly inverted, as that of a Calf or Sheep, and reduced into a broad plain: yet it may be ſo far expanded and lifted up near its border or partition, that all the interior receſſes may appear in view. The third and fourth Figures ſhew the image of an humane brain bent back: but in the ſeventh Table is ſhewn the aſpect or ſight of a Sheeps brain wholly unfolded, and as it were ſpread plain.

In the leſſer four-footed Beaſts, as a Mouſe, an Hare, Coney, and ſome others, the ſuperficies of the brain being wholly plain or even, wants the turnings and windings; however from the complication of the border, and the under-ſtretching of the *Fornix*, there reſults a cavity repreſenting Ventricles.

After that we have throughly viewed all things which belong to the Brain, in the order as we have ſaid, let either Hemiſphere, covered within with the callous body, by which it hangs, be divided and removed from the tops of the oblong Marrow: which indeed may be exactly done, by cutting it near to the ſides of the Lentiform prominencies, which are found in the vulgar diſſection of the Head, within the interior Ventricles: for thoſe prominences are the tops or heights of the ſhanks of the oblong Marrow, to which the callous body is immediately fixed. When the brain

is cut after this manner, that the prominencies, which are the tops of the ſhanks of the oblong Marrow, may be left naked, let them be cut long-ways through the midſt (to wit, in the medullary part, where they are conjoyned to the callous body) and their interior ſubſtance will appear through the whole chamfered or ſtreaked; *viz.* medullary ſtreaks or chamferings are ſeen to aſcend and deſcend forward and backward; that none may doubt, but that theſe chamferings or ſtreaks were made by Nature, as it were paſſages or chanels for the paſſage and return, or going to and fro of the Spirits out of the callous body into the oblong Marrow, and on the contrary. The Figure of the ſhanks of the oblong Marrow, divided from the Brain, with their tops, which are the chamfered bodies, is expreſſed in the eighth Table.

After theſe ſtriated or ſtreaked bodies, the ſhanks of the oblong Marrow being divided for a little ſpace, go forward, then being united, they meet together in the ſame ſtock, made up as it were of two ſtems. But the ſtock or trunk of the oblong Marrow in its whole tract, *viz.* before and after the coalition of its ſhanks, hath many Proceſſes, Appendices, Prominences, and Inſertions of Veſſels, ſome of which ariſe from one ſide, and others from the other ſide, and make it unequal, with various productions and protuberances; of which hereafter.

The Firſt Figure

SHews the Baſis of an humane Brain taken out of the Skull, with the Roots of the Veſſels cut off.

AAAA. *The anterior and poſterior Lobes of the Brain quadripartite or divided into four parts.*

BB. *The Cerebel or little Brain in the hinder part of the Head.*

CC. *The long Marrow or Pith.*

DD. *The ſmelling Nerves or the firſt pair.*

EE. *The Optick or ſeeing Nerves the ſecond pair.*

FF. *The moving Nerves of the Eyes the third pair.*

GG. *The pathetick Nerves of the Eyes or the fourth pair.*

HH. *The fifth pair of Nerves.*

II. *The ſixth pair of Nerves.*

KKKK. *The auditory or hearing Nerves and their two proceſſes on either ſide of them the ſeventh pair.*

LLllll. *The wandring pair, or the eighth pair conſiſting of many Fibres.*

MM. *The Spinal Nerves coming from afar to the origine of the wandring pair.*

NN. *The ninth pair conſiſting alſo of many Fibres (which tending downwards, grow together into one Trunk) which ariſes a little above the proceſs of the hinder part of the Head.*

OO. *The tenth pair tending downwards.*

PP. *The Trunk of the Carotidick Artery cut off where it is divided into the anterior and poſterior Branch.*

QQ. *A Branch of it going in between two Lobes of the Brain.*

R. *The anterior Branches of the Carotides go away united, moving forward into the fiſſure or cleft of the Brain.*

S. *The poſterior Branches of the Carotides united, and meeting with the Vertebral Trunk.*

TTT. *The Vertebral Arteries and their three Branches aſcending.*

V. *The Branches of the Vertebrals growing together into one Trunk.*

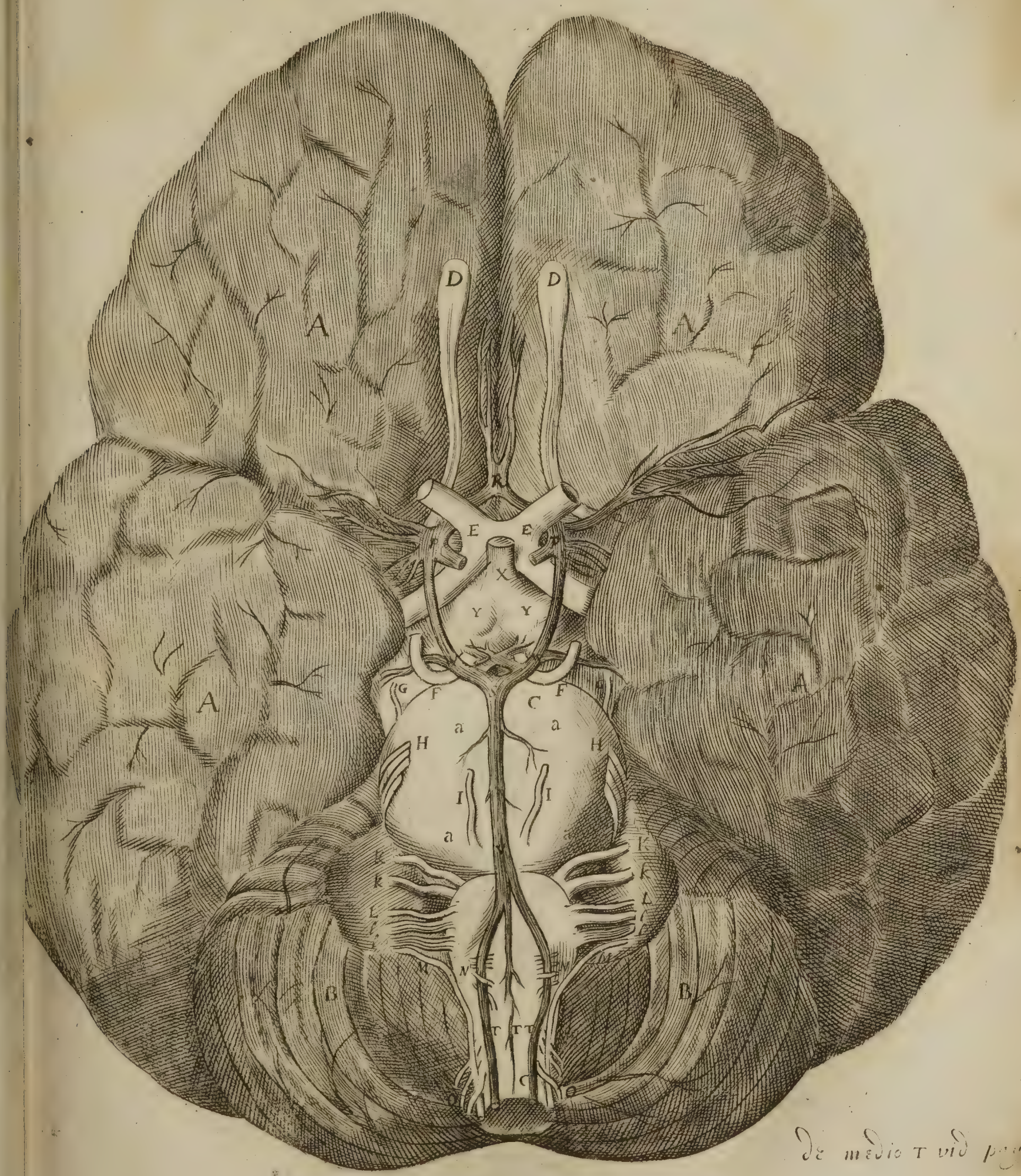
WW. *The place deſigned where the Vertebrals and the Carotides are united, and either Branch aſcends to the Choroidal infolding.*

X. *The Tunnel.*

YY. *Two Glandula's or Kernels placed behind the Tunnel.*

aaaa. *The annulary Protuberance, which being ſent from the Cerebel, embraces the ſtock of the long Marrow.*

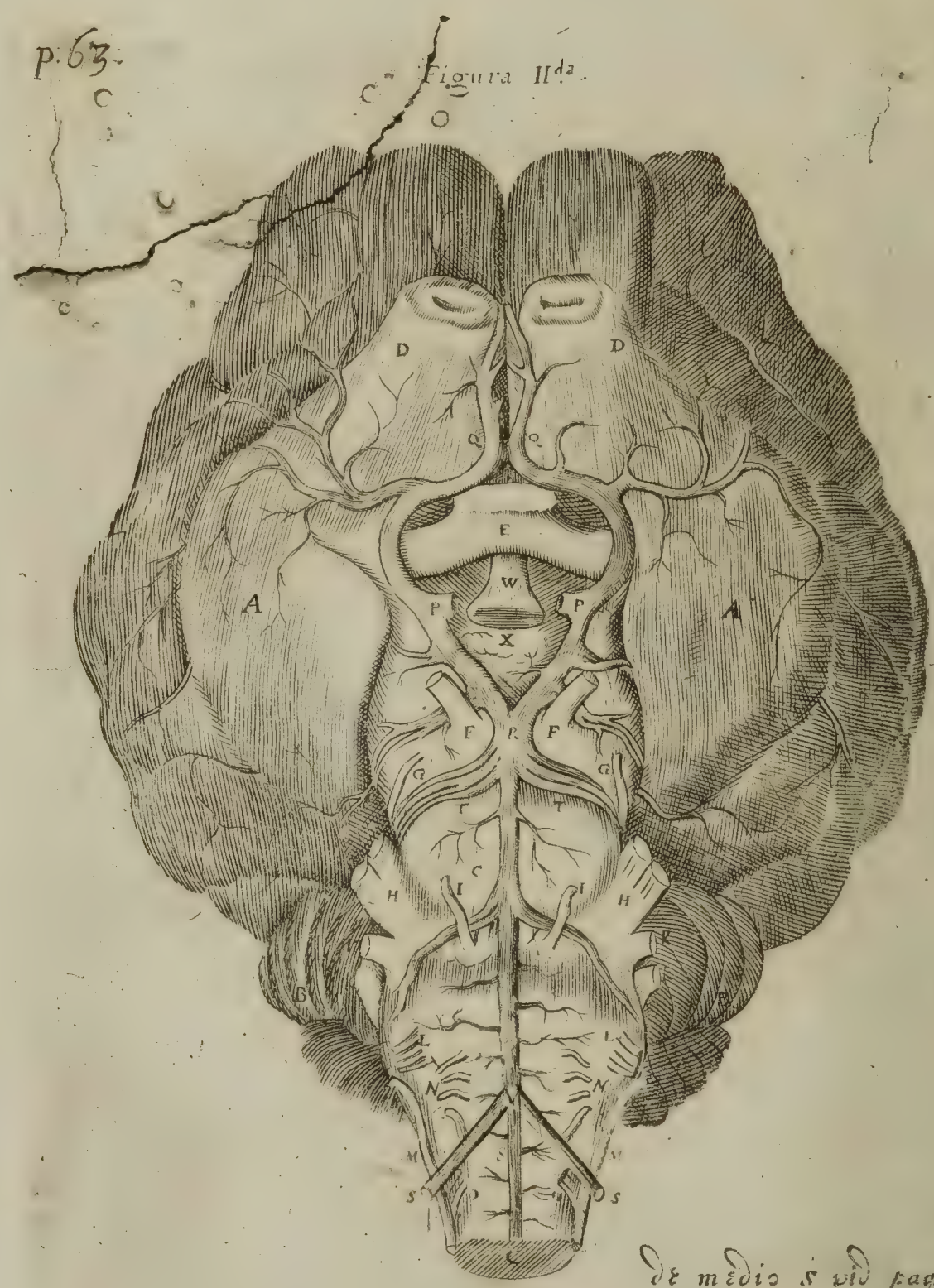
Figura 1ª



De medio T vid pagina

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Figura II^da.



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The Second Figure

Shews the Basis of a Sheeps Brain taken out of the Skull, and the Roots of the Vessels cut off, where all the Arteries, by Ink being injected into one of the Carotides, are made black and more conspicuous.

AA. *Two Hemispheres of the Brain without Lobes, different from that in a Man.*
BB. *The lateral portions of the Cerebel.*
CCC. *The oblong Marrow.*
DD. *The olfactory or smelling Nerves cut off nigh to the mammillary Processes, that their Cavities may appear.*
E. *The coalition or joyning together of the Optick Nerves.*
FF. *The motory Nerves of the Eyes, or the third pair.*
GG. *The Pathetick Nerves, or fourth pair.*
HH. *The fifth pair: the Trunk of which Nerve is presently divided into two Branches.*
II. *The sixth pair.*
KK. kk. *The seventh pair, or the hearing Nerves, on either side of which are two Processes.*
LL. *The eighth or wandring pair, the origine of which is made up of very many Fibres seeming to grow together.*
MM. *A Nerve coming out of the spinal Marrow to the beginning of the wandring pair.*
NN. *The ninth pair, consisting also of divers Fibres arising distinctly, which afterwards grow together into one Trunk.*
OO. *The tenth pair tending downwards.*
PP. *The Trunk of the Carotidick Artery cut off, where it is divided into the anterior and posterior Branch.*
QQ. *The inosculation of the anterior Branches.*
R. *The posterior Branches of the Carotides united, and meeting with the Vertebral Trunk.*
SSS. *The Vertebral Artery ascending with a triple Branch.*
TT. *Where the Carotides meet the Vertebral, and on either side many Arteries ascend to the Choroeidan infolding.*
V. *The coalition or joyning together of the Vertebral Branches into the same Trunk.*
W. *The Tunnel.*
X. *A white Glandula or Kernel placed behind it.*

CHAP. II.

The Parts of the oblong Marrow, and the rest of the hinder Parts of the Head are recounted, and their Dissection shewn.

HAving described both the Meninges, and the ramifications of the Vessels in them, also the fabrick of the Brain, properly so called; and next shewed its outward partition gathered together into folds about the shanks of the oblong Marrow, and either middle or marrowy part of it hung to the chamfered bodies; we will now follow the remaining parts of the Head in order.

The chamfered or streaked bodies, or the tops of the oblong Marrow, are two lentiform Prominences, which are beheld within the former Ventricles of the Brain, as they are commonly termed; the heads of these, which are more large and blunt, incline mutually one to another, and are almost contiguous. Out of the angle of this inclination the *Fornix* arises with a double root; to which is subjected or underlaid a certain transverse medullary process, and seems to knit together these streaked bodies, as may be seen in the seventh Table GG: but the ends of those bodies, being made sharper, are reflected outward, and make as it were two sides, with a sharp triangle, to whose anterior superficies the marrow of the callous body sticks for a long tract; where, if these bodies be cut long-ways through the midst, the medullary streaks (as was already said) will presently appear. The figure and place of these, as also the medullary chamferings, are truly represented in the eighth Table.

Where the streaked bodies end, the chambers or *Thalami*, as they are termed, of the optick Nerves, possess the next part to the oblong marrow; to wit, in this place,

its ſhanks riſe into unequal protuberances, out of the ridges of which the Optick Nerves ariſe, and from thence, being bent down in the fore-part with a certain compaſs, they joyn together about the baſe of the ſame marrow, and ſeem to be united; by and by being again parted, and going forward towards the ball of the Eye, they go out of the Skull. In this place the ſhanks of the oblong marrow in a Man are for the moſt part diſtinct, and gaping one from another, leave a deſcending opening, which is the paſſage to the Tunnel; but in moſt four-footed Beaſts the ſhanks of the ſame medullary ſtocks are there diſtinct, only a little lower, and have a chink cut for the Tunnel: but the ridges of them, in which the beginnings of the Optick Nerves lye hid, are ſomewhat conjoyned, and for the ſpace of half an inch do grow together. Wherefore in Brutes there is one hole before this growing together, and another behind it, both which lead towards the Tunnel. The reaſon of this difference is, becauſe in a Man, for that the frame or ſubſtance of the brain it ſelf is very large, and that its marrowy parts are remote one from another, it is behoveful for its ſhanks, whereby the tops of the oblong marrow may be the better fitted to the ſame, to be ſeparated, and from their mutual touching to be bent into a greater aperture. Hence it is obſerved, that in a Man the ſhanks of the oblong marrow, from the hanging on of the brain, go forward with a greater angle of inclination, and with a certain bending compaſs; but in Brutes the ſame lye almoſt parallel. After what manner theſe parts are formed in an humane brain the third and fourth Figure ſhews; after what manner they are in four footed Beaſts is ſhewn in the ſeventh Figure.

From the ſame ridges of the medullary ſhanks, from whence the Optick Nerves take their origines, certain medullary proceſſes ariſing, and being dilated on either ſide above the brim of the ſecond hole, grow together about the root of the pineal Glandula. Theſe proceſſes (as it ſeems) are thoſe parts, which the Famous *Cartes* ſuppoſes to be Nerves belonging to the pineal Glandula: but I rather ſuſpect them to be productions only, by which the Optick Nerves may alſo communicate near their origines. Their figure is very well deſcribed in the ſeventh Table.

After the *Thalami* or Chambers of the Optick Nerves, other notable protuberances, commonly called *Nates* and *Teſtes*, the Buttocks and Teſticles (of the brain) grow to the ſuperior part of the medullary Trunk or ſtem, and cover its ſuperficies about the ſpace of an inch; and for that they are not contiguous in the midſt, there is under them a certain hollowneſs in their whole tract. Theſe protuberances are leſſer in a Man, alſo in a Dog and Cat; laſtly, if we obſerved rightly, in other living Creatures, which are newly brought forth, that are impotent, and not inſtructed for the finding out of food. In a Calf, Sheep, Hog, and the like, they appear far greater: in Fiſhes and Fowls they are wholly wanting.

In number they are four, *viz.* two grow to either ſide of the oblong marrow. The former called *Nates* or the Buttocks, ſeem the greater and principal; to which the other latter called *Teſtes* or the Teſticles, hang as if growing out of them. As to their figure, they are round, and are commonly taken for two ſhanks on either ſide of the brain and Cerebel planted near, which being bent inwardly, and turned back one towards the other, are ſaid to grow together, and ſo to conſtitute the oblong marrow. But this opinion, as we ſhall ſhew more largely hereafter, by the diſſection ordered according to our Method, is clearly falſe. For it plainly appears, that the brain is fixed, long before theſe bodies, to the oblong marrow; nor is there any commerce between theſe and that, unleſs very remote.

But if the ſite of theſe parts, and their reſpects and habitudes to the neighbouring bodies, be well noted, it will appear plainly, that they make as it were a certain peculiar Region wholly diſtinct from the Brain and Cerebel, alſo from the oblong marrow it ſelf. Their ſituation is remote enough from the fore-parts, and ſufficiently ſeparated by the Cavity or Ventricle under-lying from the medullary ſtock or ſtem: yea a proper way, or one proceſs, ſeems to lead from the long marrow into theſe prominences, and another to go from them, and thence to be carried into the Cerebel. From hence we may ſuſpect, that theſe prominences (eſpecially the Natiform, or of the ſhape of a Buttock, which are the chief) are certain places of diverſion, in which the animal Spirits go apart in their paſſage from the oblong marrow into the Cerebel, and from this to that on the other ſide, and there ſtay for ſome animal uſes, of which we ſhall ſpeak hereafter. As to the way, which leads from the oblong marrow into theſe prominences; it is manifeſt, that beneath the origines of the Optick Nerves on either ſide a medullary Proceſs deſcends, with little Villages

proper

proper for it ſelf, which terminates in the aforeſaid prominencies. Then, if from theſe, you look for a paſſage out, it is equally clear, that from the hindermoſt prominences, which are called *Teſtes*, on either ſide, a medullary proceſs doth obliquely aſcend, which being dilated into the Cerebel, is divaricated through its whole frame. But that the Natiform or Buttock-formed Prominences are Principals, and the *Teſtes* their dependences, or the heads of medullary Proceſſes, which are carried from thence into the Cerebel, manifeſtly appears in a Sheep, Calf, or Horſe, and in ſome others, where the *Nates* are of a noted magnitude, the *Teſtes* of a very ſmall bulk grow to them, and in the middle between theſe the medullary Proceſſes, the Appendices of the former Prominences, exiſt. The aforeſaid Prominences, as alſo the medullary Proceſſes, which lead forward and backward, to and from them, are aptly repreſented in the fourth Table, but yet more clearly in the eighth Table TT. PP.

Further, becauſe the animal Spirits reſiding in either Promptuary and Appendix, before they are carried to the Brain, ought to be confounded and mingled together, therefore the two prominences of either ſide do mutually grow together as it were with wings ſtretched out one to another; but for as much as it is behoveful for thoſe growings together to be diſtinguſhed from the oblong marrow, therefore an hollowneſs comes between, which is by ſome eſteemed the fourth Belly, and by others a paſſage to it. Theſe prominences in a Man, Dog, and Cat, and ſome other Animals (as was above mentioned) are very ſmall, and almoſt even; alſo they appear, as the other portion of the oblong marrow, of a white colour. In a Calf, Sheep, Horſe, and many other four-footed Beaſts, the former protuberances, commonly called *Nates* or Buttocks, are remarkably great, alſo outwardly they appear to be of a fleſh colour, becauſe they are cloathed with the thin Meninx or *Pia Mater*, which contains in it ſelf very many Veins and Arteries; which if ſeparated, the interior ſubſtance of thoſe parts is of a wanniſh colour, and ſuch as is not in all the oblong marrow or pith beſides. But it plainly appears, as in Brutes, ſo in Man, the hinder or poſterior prominences are Epiphyſes or additions of the former, and that from theſe additions or dependences the medullary proceſſes aſcend obliquely into the Cerebel; near which, other proceſſes cutting thoſe, deſcend direct from the Cerebel, which ſeem not to be inſerted into the medullary Trunk, but going about it, do conſtitute the annulary or ringy protuberance. This annulary protuberance is greater in a Man than in any other Creature. Beſides, it is obſerved, that where-ever the ſuperior prominence of the Buttock-form is larger, this inferior annulary is very ſmall; and ſo on the contrary. Further, thoſe medullary proceſſes, aſcending towards the Cerebel, communicate mutually among themſelves by the other tranſverſe medullary proceſs; and out of this tranſverſe proceſs, two ſmall little Nerves ariſe, the fourth pair of thoſe which we have recounted, and which are called by us Pathetical. Each of theſe, delineated in fit figures, the ſeventh Table ſhews clear enough.

Not far from the aforeſaid Prominences, to wit, between theſe and the Chink, which is called the *Anus* or Arſe-hole, the Pineal Glandula or Kernel is placed. This is put in a Valley, which lyes between the Natiform protuberances, and thoſe which are the Chambers or *Thalami* of the Optick Nerves; in which place that Glandula or Kernel is fixed, ſometimes by very many ſmall Fibres, and ſometimes by two noted medullary roots ſubjected to the part; and beſides, it is included in a Membrane, which is a portion of the *Pia Mater*, as in a Cheſt; and as this Membrane is ſtuffed with very many Arteries and Veins, ſome ſmall Veſſels alſo enter into this Glandula.

Under the Prominences but now deſcribed, (as was above hinted) a narrow Cavity or Ventricle is ſtretched out with a long paſſage, which, although it obtains ſome egregious uſes, yet it ſelf ſeems to be only ſecondary, and as it were by chance; for that the proceſſes of either prominence ought to be conjoyned among themſelves, and to be diſtinguiſhed from the under-lying medullary Trunk. Two holes lye open into this Trunk, one of which is placed in the beginning, and the other in the end of it, and through the middle of its paſſage the down-bending aperture tends towards the Tunnel; ſo that the ſerous humor entring at either hole, may preſently ſlide away into the Tunnel. Moreover, into the ſame aperture of the Tunnel there lyes open another paſſage, to wit, through the firſt hole, which is placed near the roots of the *Fornix*; ſo that from every quarter of the Head the ſeroſities might be carried into that ſink: to wit, that through the firſt hole, from the infoldings or the anterior Ventricles of the Brain; through the ſecond hole, the humors which are gathered about the orbicular prominences, do come away; and through the third hole, thoſe

which are laid up nigh the confines of the Cerebel, do find a paſſage. Theſe ſeveral holes, with the diſtinct ways to the Tunnel, are plainly delineated in the ſeventh Table H. M. T.

Above the Pineal Kernel, as it were above the Button, the infolding of the Choroeides ſeems to be hung; now this infolding is made after this manner: out of either ſide of the oblong marrow, where the border of the brain is knit to it, two Arteries ariſing from the poſterior branches of the Carotides, where they are united to the Vertebrals, do directly aſcend; which being preſently divided, like many Rivers planted near together, are carried towards the pineal Glandula, and there ſeem to be terminated by a mutual meeting: and in that place, out of the fourth boſom, ſent down upon the pineal Glandula, the veinous branches come out on both ſides, which in like manner being divided into filaments or ſmall threads, meet with the capillary or hairy Arteries, and are in many places inoculated into them, and variouſly complicated with them; and ſo theſe Veſſels, being Net-like, much interwoven among themſelves, and interſerted with the Glandula's, do conſtitute the to be admired infoldings. Theſe kind of infoldings of the Veſſels, as it were with two out-ſtretched wings, are thruſt out on either ſide upon the ſhanks of the oblong marrow, even to the ſtreaked bodies; but yet they only lye upon their ſuperficies, nor are they more firmly affixed either to the oblong marrow, or to the callous body by any inſertions of the Veſſels; ſo that the blood ſeems only to be brought to theſe places, and carried away without any afflux of it made into the ſubjected parts; for what uſes ſhall be ſpoken of hereafter. The Choroidal infoldings, with the pineal Glandula, are drawn out in the ſeventh Table G. F. E.

And thus far concerning the appearances found above the oblong Marrow, between the ſtreaked bodies and the Cerebel; which indeed are almoſt conſtantly after a like manner both in Man and four-footed Beaſts, unleſs that they only differ in bigneſs. Within this ſpace, in the Pedeſtal or Baſis of the ſame Marrow, many things worth noting occur: For beſides the ends of the cut off Veſſels, which are above recited, the ſite and ſtructure of the Infundible or Tunnel deſerve conſideration. For behind the coalition or joyning together of either Optick Nerve between the ſhanks of the oblong marrow there gaping, is ſent down a receptacle as it were tubulated or made like a Pipe, covered without with a thin Membrane ariſing from the *Pia Mater*, and defended within with a medullary ſubſtance. The orifice of this is placed higher between the ſhanks of the oblong marrow, and receives their bending aperture; from thence a ſhort Tube or Pipe being ſent down, is inſerted to the pituitary Glandula or Kernel. We ſee this Tube in an Horſes brain greater than a Gooſes quill, alſo ſhining and full of clear water; that it is not to be doubted, but that by this way the ſerous humors ſlide away from the brain to the pituitary Glandula: but how theſe humors are carried away from thence, ſhall be afterwards inquired into, becauſe they are not carried into the Palate or roof of the mouth, as is commonly believed.

Nigh the lower border of the Tunnel, in a Man, underneath there are two whitiſh Glandula's; though in Brutes only one, but greater, is found. What is the proper uſe of this part ſhall be told hereafter: in the mean time, whether it be doubled or only one larger, it ſeems to be as it were inſtead of a bank to defend or preſerve the thin Membrane of the Tunnel, leſt it ſhould be broken or thruſt out of its place: on the other ſide the growing together of the Optick Nerves ſerves inſtead of the ſame kind of defence.

What beſides is contained in this ſpace are only the ſhanks of the oblong marrow it ſelf, which proceed directly from the chambers of the Optick Nerves towards the hinder part of the Head in a ſtraight paſſage; and when both grow together below the Tunnel, they are afterwards diſtinguiſhed in their whole tract by a line drawn through the midſt. Theſe ſhanks of a mans brain are far larger than in brute beaſts: to wit, in that they ſeem to be made up of very many medullary chords or ſtrings joyned together in one, as if in this common paſſage and high-way of the animal Spirits, they were ſo many diſtinct paths, which the Spirits enter into reſpectively, according to the various impulſes of ſenſe and local motion. Moreover, this ſpace of the oblong marrow therefore appears ſhorter and more broken in a man, becauſe much of it is hid by the annulary protuberance, which is ſent from the Cerebel, and is very big. The *Pia Mater*, all about covering the ſides of this medullary Trunk, cloaths them with moſt thick infoldings of the Veſſels; by which heat and the nervous juyce are carried, as a continual proviſion for the Spirits, taking a long journey. Thus much

for

for the first Section, or anterior portion of the oblong marrow: now our order carries us to the inspection of its hinder Region, to wit, where the Cerebel grows to it; and the Processes sent from this either compass about its Trunk, or are inserted into it; out of which also, the other Nerves produced within the Skull, take their beginnings. Concerning these we will speak in order.

CHAP. III.

A Description of the Cerebel and its Processes, also of the hinder Region of the oblong Marrow.

BElow the orbicular Prominences, the Cerebel follows to be inspected. The figure of this, like the Brain, is somewhat globous, also it appears unequal, marked with certain turnings and windings about; the ridges and furrows of whose turnings about the *Pia Mater* stretches over, and reaches out the infoldings of the Vessels to them all, and deeply inserts them into all. However the Cerebel is diversified or variegated with its turnings and rollings about, not as the Brain, after an uncertain manner; but its folds are disposed in a certain orderly series; for the exterior frame of it seems to consist of thin lappets, or little rings or circles, being contiguous and infolded, also going about through the whole compass with a parallel site or situation.

Either Region of the Cerebel, to wit, the former and the hinder, is terminated in a process in form of a Worm. According to these ends, as it were in a double Pole, these Circles are very short; thence ascending towards the top or Equator, they are by degrees enlarged, as it were Parallels in a Sphere or Globe. These Circles are outwardly Cortical or barky, and within medullary, and all their marrowy parts pass into two ample middles; which indeed seem to be the same in the Cerebel, as the callous body in the brain.

The Cerebel in some Animals consists of one frame, and all its little circles are placed in the same parallel site, and keep the same proportion among themselves; but in others there grow to the Cerebel as it were the primary Sphere, and endued with greater circles, some other bodies as it were Wens or Extuberances, or additional Spheres marked with lesser circles. These being eccentrick to the Cerebel it self, have oftentimes labels or folds ordered in a diverse series from it.

But the Cerebel it self (whether it hath these little Excrescences growing to it or not) is found almost in all Animals of the same figure and proportion, also made up of the same kind of labels or lappets. Those which have the brain diversly framed from a Mans, as Fowl and Fishes, also among four-legged Creatures, Conies and Mice, whose brains want turnings about or convolutions, have the like species and the like disposition of the folds and composure of the other parts of the Cerebel. The reason of this difference in the brain, and of the conformity in the Cerebel, is rendred hereafter, when we treat of the Use of the Parts.

As the Brain, within its Cavity, hath the Choroidal infolding made up of Arteries and Veins variously complicated, and of Glandula's thickly interserted; so also the Cerebel hath got the like infoldings of Vessels, and those marked with very many Glandula's, and greater than those in the Choroidal infolding. These infoldings and heap of Kernels, the *Pia Mater* being separated, which clothes the hinder part of the Cerebel, easily appear in sight; for in that place these creep upwards on either side nigh the Worm-shaped process, as it were with two branches; and receive the Artery on either side, from the Vertebral Artery, lying under the Basis of the oblong marrow and the veinous passages, sent from either lateral bosom. We shall inquire hereafter into the use of this Infolding and of its Glandula's.

In the mean time, that we may describe the site and hanging on of the Cerebel; the same standing on the oblong marrow seems to be fixed to its sides, as it were by two little feet; between which, planted on either side, and the Cerebel placed above, and the trunk of the long marrow below, (because all these should be distinct one from the other) there comes a cavity or hollowness between, which is commonly called the four Bellies.

In

In either little foot, ſuſtaining the Brain, are found three diſtinct medullary Proceſſes. The firſt of theſe, ſent from the orbicular Protuberances, aſcends obliquely; the ſecond deſcending ſtraight from the Cerebel, and paſſing through the other acroſs, compaſſes about the oblong marrow; the third proceſs, deſcending from the hinder Region of the Cerebel, is inſerted into the oblong marrow, and increaſes its trunk as it were with an additional cord or ſtring. Theſe ſeveral Proceſſes are truly repreſented in the ſeventh Table Q. P. R.

But as to what belongs to the annular or ringy Protuberance, by which the medullary Trunk, both in Man, and in ſome four-footed Beaſts, is compaſſed about, that is made after this manner. The ſecond or middle proceſs of the Cerebel, deſcending ſtraight to the oblong marrow, ſeems not to be implanted in it, aſſoon as it touches its ſides, but growing into a larger bulk, goes about the ſuperficies of the ſame marrow with divers circular Fibres. And ſo when in either ſide both thoſe kind of proceſſes of the Cerebel, being dilated or carried from the top of the medullary Trunk toward its Baſis, do mutually meet, they make that circular protuberance. The ſubſtance of this is far larger in a Man than in any other Animal; in an Hare, Rabbet, Mouſe, and the like, it is very ſmall; in Fowl it is either wholly wanting, or for its ſmalneſs ſcarce to be diſcerned by the eyes. Concerning its bulk, this is a conſtant obſervation. They who have the orbicular prominences before the Cerebel ſmall, have this annulary protuberance very big; and on the contrary, they who have thoſe prominences big or very great, have this ring very ſmall: further, they who wholly want the Buttock-form protuberances, as in Fowl, ſeem alſo to want this annulary.

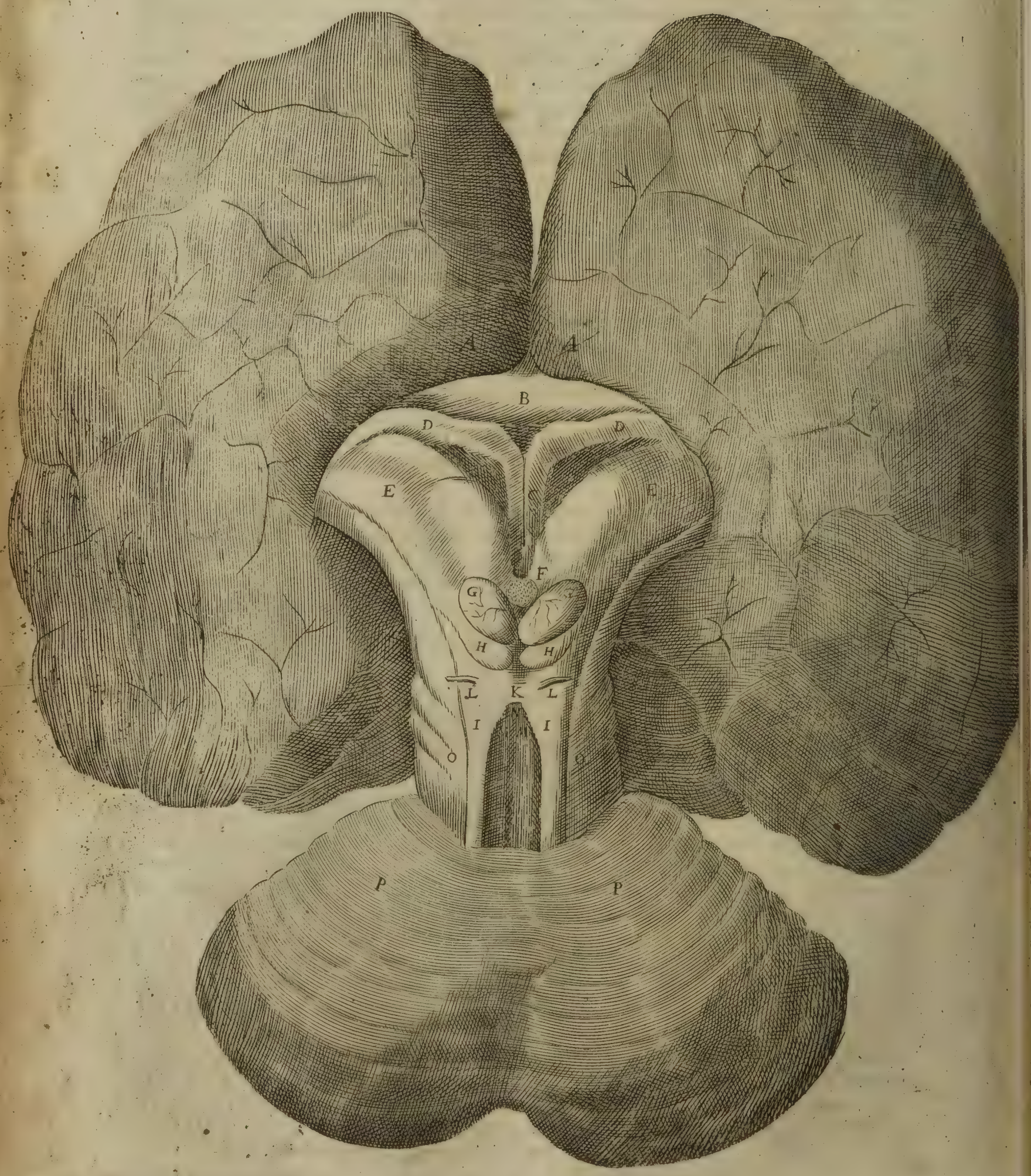
In many brute Animals, but not in Man, nigh to this greater Protuberance, a little lower, another leſſer, in like manner orbicular, ſtands, and compaſſeth about the ſuperficies of the oblong marrow; the root of which is a white and medullary line, ſtretched out under the Cerebel, above the bottom of the fourth Ventricle. From the ſides of this leſſer protuberance the auditory Nerves ariſe: In Man the auditory or hearing Nerves are ſeen to ariſe out of the utmoſt brim of the greater protuberance, in like manner they have for their root a white medullary line covering the fourth Ventricle.

That this line, and the three diſtinct medullary Proceſſes, which conſtitute either little foot of the Cerebel, may be more plainly ſhewn, alſo that the moſt inward frame of the Cerebel may be viewed, its whole globe ought to be cut through both Poles, *viz.* in the middle through the Vermiform or Worm-ſhaped proceſſes; then it will plainly appear, that in either Hemiſphere there is an ample middle or marrow, wherein the marrowy branches, being ſtretched abroad on every ſide, like thoſe of a tree, ſpread through the Cortical ſubſtance of the Cerebel, every where diffuſed; and that in either middle or marrowy part, the three diſtinct proceſſes, which make either trunk, or little foot of the Cerebel, are inſerted. Each of theſe are fitly repreſented in the ſeventh Table.

Thus much for the Cerebel, and by what means it is faſtned to the oblong marrow. Beſide theſe, it is to be obſerved, that about the bottom of the Baſis of the oblong marrow, out of the greater Ring, come out two medullary ſtrings, which being diſtinct from the reſt of the medullary Trunk, go right forward towards the ſpinal marrow, and in its progreſs, being made ſtraiter by degrees, like Pyramids, after about the ſpace of an inch, end in ſharp points. The extremities of theſe conſiſt on the other ſide, where the wandring pair of Nerves have their orignal, and make a certain riſing up in the oblong marrow. Hence it is likely, that theſe ſtrings are paſſages or chanels of the animal Spirits, wherein they are carried from the greater Ring, or what is the ſame thing, from the Cerebel into the wandring pair, and the beginnings of other Nerves implanted near; for what end, ſhall be ſaid hereafter. Theſe pyramidal Bodies do not ſo manifeſtly appear ſo long as the *Pia Mater* clothes them, and hides them with the infoldings of the Veſſels; but this Membrane being pulled away, they are ſo conſpicuous, eſpecially in a Man and a Dog, that they ſeem like greater Nerves. In thoſe Animals, where the annulary Protuberance is greater, theſe proceſſes being brought from the ſame in right angles, are greater and more conſpicuous; and on the contrary, in Fowl they are clearly wanting.

Concerning this hinder Region of the Head, there is not much beſides worth noting, except the productions of the Veſſels. But there are Veſſels which chiefly belong to theſe parts, the latter ſix pair of Nerves ariſing within the Skull and the Vertebral

Fig: III.



tebral Arteries. We have already deſcribed in ſome meaſure the beginnings of the former; what belongs to the more full knowledge of them, we ſhall leave to be handled in its proper place. As to the Vertebral Arteries, they reach from about the fartheſt end of the oblong marrow, now about to end in the ſpinal, to its ſides. Theſe Veſſels, as they are ſmaller, ſo they enter the Skull with leſſer proviſion than the Carotides; for they are neither flouriſhed firſt with Net-like infoldings, nor are carried in a long journey by compaſſing about; but either Artery, paſſing directly through the Cuniform or Wedge-like Bone, embraces the medullary Trunk on either ſide. Although theſe go forward divided for a little ſpace, yet afterwards they are united, and with a ſingle chanel or paſſage, they meet with the poſterior Carotides inclining mutually one towards the other; and ſo all the branches, meeting as it were in a threefold way, are inoculated one in another. The Vertebral Arteries, firſt ſhewing themſelves within the Skull, are diſpoſed otherwiſe in Brutes than in men: in the latter they fall through the ſides of the oblong marrow parallel for ſome ſpace, then as it were with a certain ſemicircular compaſs, they mutually incline one towards the other, and preſently meet. The branches which firſt go forwards divided, are ſometimes only two, to wit, one on either ſide, ſometimes three, and then beſides the two former, another is produced in the middle. But in Brutes, either Trunk of the Vertebral Artery, at the firſt coming to the marrow, inclines preſently to the meeting of the other with an acute angle, and quickly both meet together. The *Vertebrals*, even as the *Carotides*, ſend forth manifold branches in their progreſs with an innumerable ſeries of ſhoots, which cover over the oblong marrow, the Cerebel, and all their cavities and receſſes, and water them all with a plentiful flood of blood.

Theſe are the Phænomena or Appearances which the whole frame of the Brain and its Appendix is wont to exhibit to Anatomical Inſpection, and which, as to its fabrick, and all its parts, and proceſſes, are to be found both within and without. As it is a hard and troubleſom buſineſs to inquire into the actions and uſe of each of theſe, ſo it is alſo joyned with ſo much pleaſure and profit, that I dare promiſe to my ſelf and others, that it will be a thing worth our labour and while. Yet before we enter upon this, there remain to be unfolded ſome things hid in ſome of the bones of the Skull, ſuch as are the pituitary Kernels, the admirable Net, and ſome others; alſo we ought to ſhew firſt, briefly at leaſt, a type or figure of the Brains in Fowl and Fiſhes.

The Third Figure

SHews the outmoſt or ſuperior Superficies of the humane Brain taken out of the Skull; where the border of the Brain being looſned from the knitting of the other Parts, made by the Membranes, is elevated and turned outward, that the ſhanks of the oblong Marrow, the Fornix *or arched Vault, the* Nates *and* Teſtes, *with the pineal Kernel, and other Proceſſes, may be clearly and diſtinctly beheld.*

AA. *The border of the Brain, which in its natural ſituation was contiguous to the Cerebel.*

B. *The brim or margent of the callous Body beſmearing either Hemiſphere of the Brain, which in its natural ſite leans upon the pineal Glandula.*

C. *The* Fornix *or arched Chamber.*

DD. *The Arms of it embracing the ſhanks of the oblong Marrow.*

EE. *The ſhanks of the oblong Marrow, out of which the Optick Nerves proceed, and the tops of which (ſituated further out of ſight) are the ſtreaked Bodies.*

F. *The pineal Glandula, between which and the root of the* Fornix, *ſtands the chink leading to the Tunnel.*

GG. *The orbicular Protuberances which are called* Nates *or the Buttocks.*

HH. *The leſſer Protuberances called* Teſtes *or the Teſticles, which are Excreſcences of the former.*

II. *The medullary Proceſſes which aſcend obliquely from the* Teſtes *into the Cerebel, and conſtitute part of either of its* Meditullium *or marrowy part of it.*

K. *The meeting of thoſe Proceſſes through another tranſverſe or croſs Proceſs.*

LL. *The beginning of the pathetick Nerves out of the meeting of the aforeſaid Proceſſes.*

MM. *A portion of the oblong Marrow lying under the aforeſaid Proceſſes and Protuberances.*

N. *The*

N. *The hole of the Ventricle or Cavity which is placed under the orbicular Protuberances.*
OO. *A portion of the annulary Protuberance ſent from the Cerebel, and embracing the oblong Marrow.*
PP. *The outmoſt and upper ſuperficies of the Cerebel.*

The Fourth Figure.

The Effigies of an humane Brain of a certain Youth that was fooliſh from his birth, and of that ſort which are commonly termed Changelings; the bulk of whoſe Brain, as it was thinner and leſſer than is uſual, its border could be farther liſted up and turned back, that all the more interior parts might be more deeply beheld together.

AA. *The border of the Brain lifted up, and very much bent back, which in its natural ſite, being knit to the oblong Marrow, nigh the Cerebel, did hide the* Nates *and* Teſtes.
B. *The border or inferior margent of the callous Body.*
CC. *The* Fornix, *with its two Arms, embracing the ſhanks of the oblong Marrow.*
DD. *The internal cavity or hollowneſs of the Brain reſulting from the folding together of its border about the oblong Marrow.*
EE. *The tops of the ſhanks of the oblong Marrow, or the ſtreaked or chamfered Bodies.*
FF. *The Chambers of the Optick Nerves.*
G. *The pineal Kernel, between which and the root of the* Fornix *the hole is, whoſe paſſage leads both to the Tunnel, and to the Ventricle lying under the orbicular Protuberances.*
HH. *The Protuberances called* Nates.
II. *The Protuberances called* Teſtes.
KK. *The medullary Proceſſes ſtretching out from the* Teſtes *to the middle of the Cerebel.*
LL. *The laid aſide Hemiſpheres of the Cerebel cut in two through the midſt, that the Trunk of the oblong Marrow may be the better ſeen, where its medullary ſubſtance branches out into the form of a tree.*
M. *The Furrow below the medullary ſtock, which being covered by the Cerebel, makes the fourth Ventricle in the form of a writing pen.*
NN. *The medullary Proceſſes which ſeem to be paſſages out of the oblong Marrow into the orbicular Protuberances.*
O. *The end of the oblong Marrow giving place to the ſpinal.*

CHAP. IV.

The Parts and ſome of the Contents of the ſeparated Skull unfolded.

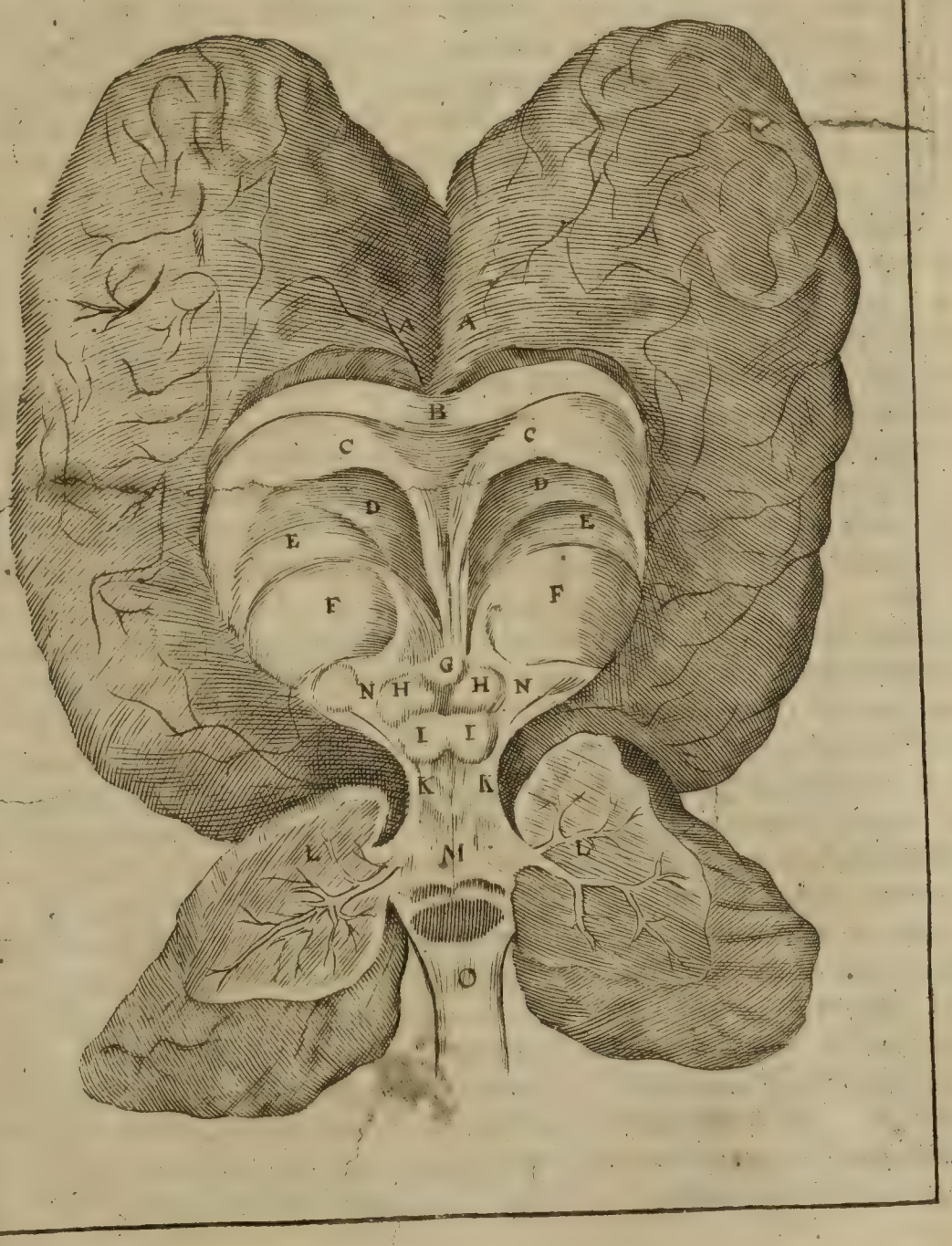
IT is not our intent, nor will it be needful for us to delineate the figures and ſituation of the ſeveral Bones of the Brain-pan, or to deſcribe their various holes, which tranſmit the Trunks of the Veſſels like the hanging weights of a Clock. All theſe are well enough known; ſo that to treat of theſe Gates or Entries is ſuperfluous. Beſides alſo, by what means the Nerves, ariſing within the Skull with their ramification or branching forth, enter the dens and caverns of the Bones, ſhall be delivered particularly afterwards. Wherefore for the preſent our buſineſs ſhall be only to take notice of ſome things, chiefly worth noting, concerning the ſanguiferous Veſſels paſſing through the Cuniform or Wedge-like Bone, not ſufficiently noted by others.

Among the various uſes and offices which the Cuniform or Wedge-like Bone yields to the Brain and its Appendix, it is not of the leaſt note or moment, that it tranſmits the Carotidick Arteries, not without a certain mechanical or artificial proviſion; and that in the middle way, by which they muſt paſs, it contains the pituitary Kernel, and ſometimes the wonderful Net. Each of theſe deſerve conſideration; the more, for that in divers Animals they are after a different manner; and becauſe it is much controverted among Phyſicians concerning their frame and uſe. But we will firſt ſpeak of the pituitary Glandula, becauſe this part, being placed higher, is obſervable to Anatomical Inſpection before others.

The pituitary Glandula or ſnotty Kernel is hid within a proper Cell or ſtall, made hollow in the middle of the Wedge-like Bone, being ſhut up in the Cheſt ſometimes more

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Fig. 111.





more ſtrictly, ſometimes more looſly: For in a Dog, Cat, and ſome other Creatures, ſticking to the Tunnel, it is pulled away together with it when it is removed; and then its bulk conſiſts of two Glandula's or Kernels diſtinct among themſelves, and eaſily to be ſeparated one from another. But in a Calf, Sheep, Hog, and many others, it is ſtrictly included on every ſide, except where it admits the Tunnel, and clothed with the hard Meninx or *dura Mater*, and with its coverings ſhut up between the cavity of the bone. Beſides, in theſe, its frame or ſubſtance ſeems but one and undivided, though, in truth, it is made up of a ſubſtance which is of a twofold nature or kind.

This Glandula is found in all perfect Creatures; for Man, all four-footed Beaſts, yea Fowl and Fiſhes are provided or endued with it: from whence we may conclude it to have ſome neceſſary uſes in the Brain. But as to its quantity or bigneſs, its proportion is various in divers Animals, according to the bigneſs of the head and body wherein it is; becauſe in a Lamb it is greater than in a Man or a Dog; alſo its bulk in a Horſe is leſſer than in an Ox. But the reaſon of this difference ſeems to conſiſt in this chiefly, for that the pituitary Glandula in ſome, reſpects the bulk of the brain only laid upon it, and in others both the brain and the Carotidick Arteries aſcending near it; and ſo as it hath a reſpect to both theſe together, or only to one, its ſubſtance or bulk is either greater or leſſer. For truly in ſome Animals the Carotidick Arteries being dilated within the Skull, are preſently divaricated into Net-like infoldings, and from thoſe infoldings many ſhoots of the Veſſels every where enter this Glandula, and are interwoven into its ſubſtance. Further, becauſe this infolding of the Veſſels, called the wonderful Net, is found very large in ſome, and in others very ſmall; therefore this Kernel, for as much as it admits from theſe, few branches, and from thoſe far more, and in ſome other Animals ſcarce any ſhoots from the Arteries, anſwers to this divers diſtributions of the Veſſels, with the various proportion of its bulk. Becauſe it is obſerved in ſome Animals, as chiefly in a Man and a Horſe, that this wonderful Net is wholly wanting; and whereas in ſuch, either Artery is carried about by a long compaſs between the receſſes of this bone; from its trunk in a man ſometimes one or two ſhoots, ſometimes none, are carried into the pituitary Kernel; alſo in an Horſe fewre branches enter into it, and ſo its bulk in theſe becomes leſſer.

But in very many other Animals (eſpecially thoſe who have the wonderful Net) it may be proved, beſides ocular inſpection, alſo by this Experiment, that many ſanguiferous Veſſels enter this Glandula: for if an inky liquor be ſquirted into the Carotides with a Syringe, the exterior part of the Glandula, that is interwoven with the blood-carrying Veſſels, will be very much dyed with a black colour. Wherefore without doubt, it may be thought, that this Glandula doth receive into it ſelf the humors, to wit, flowing into it from the Tunnel in all kind of living Creatures, and in ſome from the branches of the Carotides. Yet by which way theſe humors are carried away again, doth not ſo plainly appear; for we affirm, with the moſt Learned *Schneider*, that they do not at all fall down into the Palate through the holes of the under-lying bone. Yet in the mean time, we ſuppoſe thoſe holes to be only made to procure lightneſs to the bone; becauſe in thoſe Animals, which have the greater pituitary Kernel, thoſe holes in the bone are more and larger: further, I have often found veſſels or chanels to be contained between thoſe holes: and when I had injected Ink within the great hole of the ſame bone in a Calf, the black liquor preſently entred the leſſer Veſſels ſubject to the bone, and at laſt the Jugular Vein. And by this Experiment chiefly we conjecture concerning the office and duty of this Glandula; of which we ſhall ſpeak more fully hereafter, when we inquire into the uſe of this and the Tunnel.

Nigh to either ſide of the pituitary Kernel, if the *dura Mater* be opened, the Carotidick Artery lyes ſtretched out upon the wedge-like bone, about the length of an inch: for as this Artery riſes up below the Turky Chair, ſometimes higher, ſometimes farther within the Skull; the ſame being preſently bent in from its firſt aſcent, goes in under the *dura Mater* till it comes to the anterior border of the ſame Chair; where again being intorted, and being ſent forth upwards with a certain compaſs, it perforates the hard Meninx, and is carried ſtraight towards the Brain. So this Veſſel with its double aſcent and crookedneſs (to wit, above the Baſis of the Skull, and then above the hard Meninx, together with its ſituation, ſtretcht out in length under the ſame) repreſents in moſt the letter ſ inverſed; but in a man (as ſhall hereafter be more largely ſhewn) its ſite, by reaſon of the longer tract of the Veſſel and its greater curvature, repreſents the ſame letter double after this manner ſ ſ.

The Carotidick Artery in all Animals aſcends obliquely within the Skull; but as to its ſite or protenſion nigh the pituitary Glandula, it is not after the ſame manner in all: for in a man paſſing through the Canal-bone, peculiarly ingraven by it, with a ſingle Trunk, it lyes every where ſtretched out at length; and out of this Trunk it ſends forth ſometimes, though not always, ſome ſhoots to the pituitary Glandula. Alſo in a Horſe, its Trunk is ſingle; but where it firſt ariſes within the Skull, either Carotides, through the croſs branches ſent from one ſide to the other, before they perforate the *dura Mater*, communicate among themſelves. And as in moſt other living Creatures, the Artery, however before branched forth, yet being made one ſingle Trunk, goes into the Brain; in a Horſe either Carotick Artery being parted in two, ſends forth upwards two branches, ariſing from the *dura Mater*, in two diſtinct places.

In a Dog, Fox, Sheep, Calf, Stag, and many other four-footed beaſts, either of the Carotides, whilſt hid within the Skull under the *dura Mater*, being divided into ſmall ſhoots, and complicated with other Veſſels, to wit, both Veins and nervous Fibres, conſtitutes the Net-like infoldings; which infoldings, being ſtretched out on either ſide of the Turky Chair, fill the cavity there exiſting; then after manifold divarications of all the Veſſels, ſome arterious ſhoots being diſintangled from the others, and again united, grow together into one Trunk, which boring thorow the *dura Mater*, paſſes ſtraight into the Brain.

The aforeſaid Infolding is, commonly called the wonderful Net, and that deſervedly, for there is nothing in the whole fabrick of the animal Body more worthy of admiration; in which, beſides the arterious little branches which proceed from either of the aſcending Carotides, the veinous ſhoots, though fewer, meet with thoſe deſcending from the inward Jugular branches; and both kinds of Veſſels being divided into ſmall ſhoots, like a bundle of twiſted ſilk, are variouſly folded together: which complications of the Veſſels however are ſuſtained by the nervous Fibres, ſupplied from the greater Trunk of the fifth pair of Nerves. The aforeſaid infolding of the Veſſels or wonderful Net in ſome Animals is far greater, and contains much more divarications of the Veſſels than it hath in others; for in a Calf, Sheep, Goat, which are fed with graſs, its frame is larger than in a Dog, Cat, and other fleſh-eating and hotter Brutes. Further, it is obſervable, where the wonderful Net is greater, that the infolding of one ſide is ingrafted into the infolding of the other oppoſite ſide, and that from both, many more ſhoots of the Veſſels do enter into the pituitary Kernel; ſo indeed, that if you ſhall inject Ink into the Trunk of the Artery below the Skull, the Veſſels on either ſide, or the infoldings, will be dyed with the ſame tincture, and the black liquor will flow out of the Trunk of the oppoſite Artery.

In truth we have often ſeen this kind of Experiment repeated. Let the Carotidick Arteries be laid bare on either ſide of the *Cervix* or the hinder part of the Head, ſo that their little Tubes or Pipes, about half an inch long, may be exhibited together to the ſight; then let a dyed liquor, and contained in a large Squirt or Pipe, be injected upwards in the trunk of one ſide: after once or twice injecting, you ſhall ſee the tincture or dyed liquor to deſcend from the other ſide by the trunk of the oppoſite Artery: yea, if the ſame be more copiouſly injected towards the Head, from thence returning through the Artery of the oppoſite ſide, it will go thorow below the Præcordia, even to the lower Region of the Body; when in the mean time, little or nothing of the ſame tincture is carried thorow the outward and greater Jugular Veins. Then the Head being opened, all the Arteries, before the entrance of the Head, and the Veins of the ſame band with them, will be imbued with the colour of the ſame injected liquor. Further, in the Veſſels which conſtitute the wonderful Net, and which cover the Baſis of the Brain, ſome footſteps of the ſame tincture will appear. But that this liquor doth deſcend ſo plentifully by the oppoſite Artery, and not by the Jugular Vein, either aſſociate or oppoſite, the reaſon is, becauſe it cannot enter thoſe Veins, unleſs the region of the whole Brain, being firſt paſſed thorow, it had entred the boſom; but the liquor being plentifully injected, could not ſo ſuddenly paſs through the very ſmall Veſſels covering the Brain: wherefore rather than the force ſhould be carried to the Brain by the violent impulſe of the liquor, it, returning from the injection, and otherwiſe threatning a flood to the Brain, finds the way of receding alſo by the oppoſite Arteries, for that end, both before they enter the Brain, and after they have entred it, communicating among themſelves. And here we cannot ſufficiently admire ſo provident (and to be equalled by no mechanical Art) a diſpen-

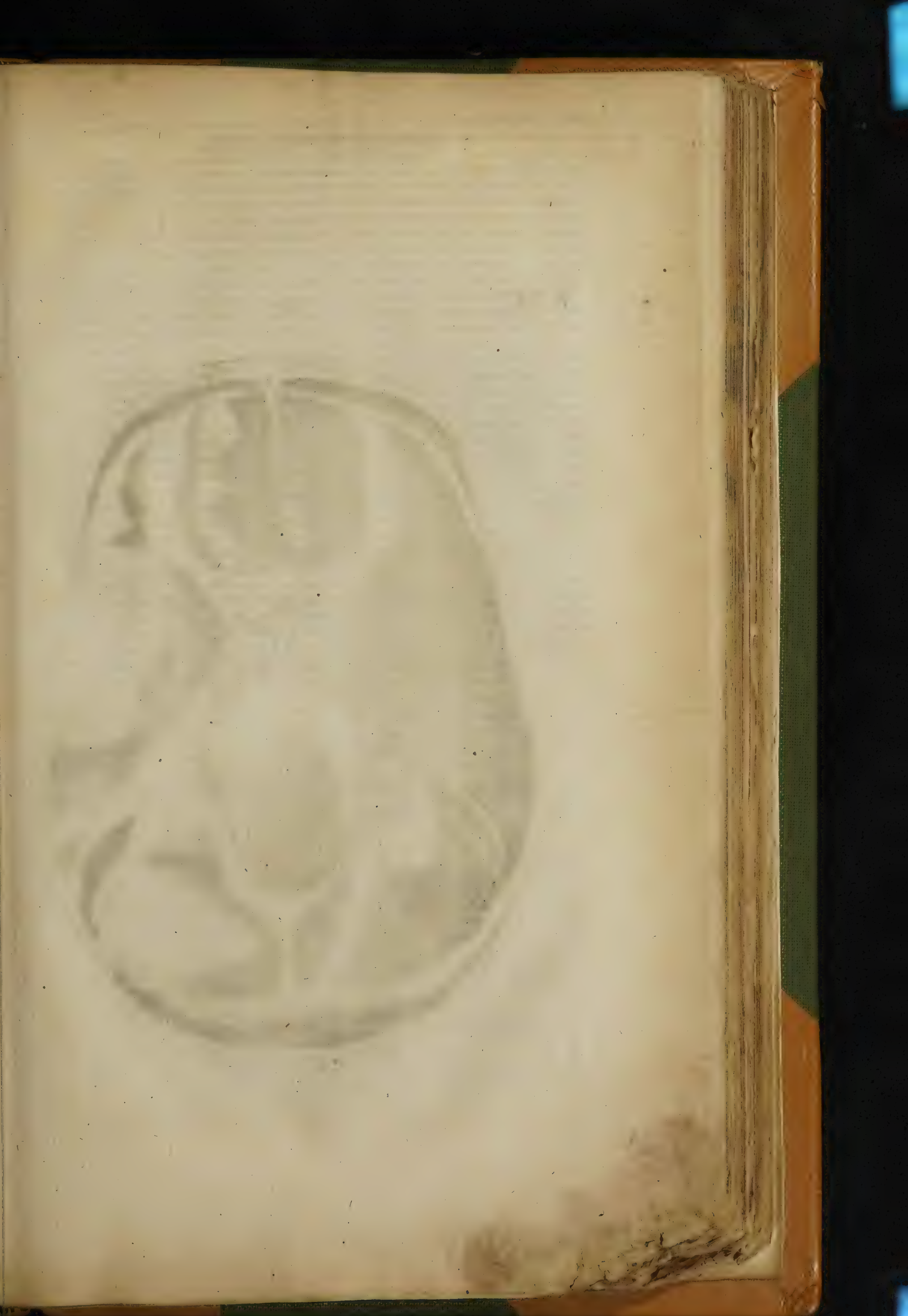
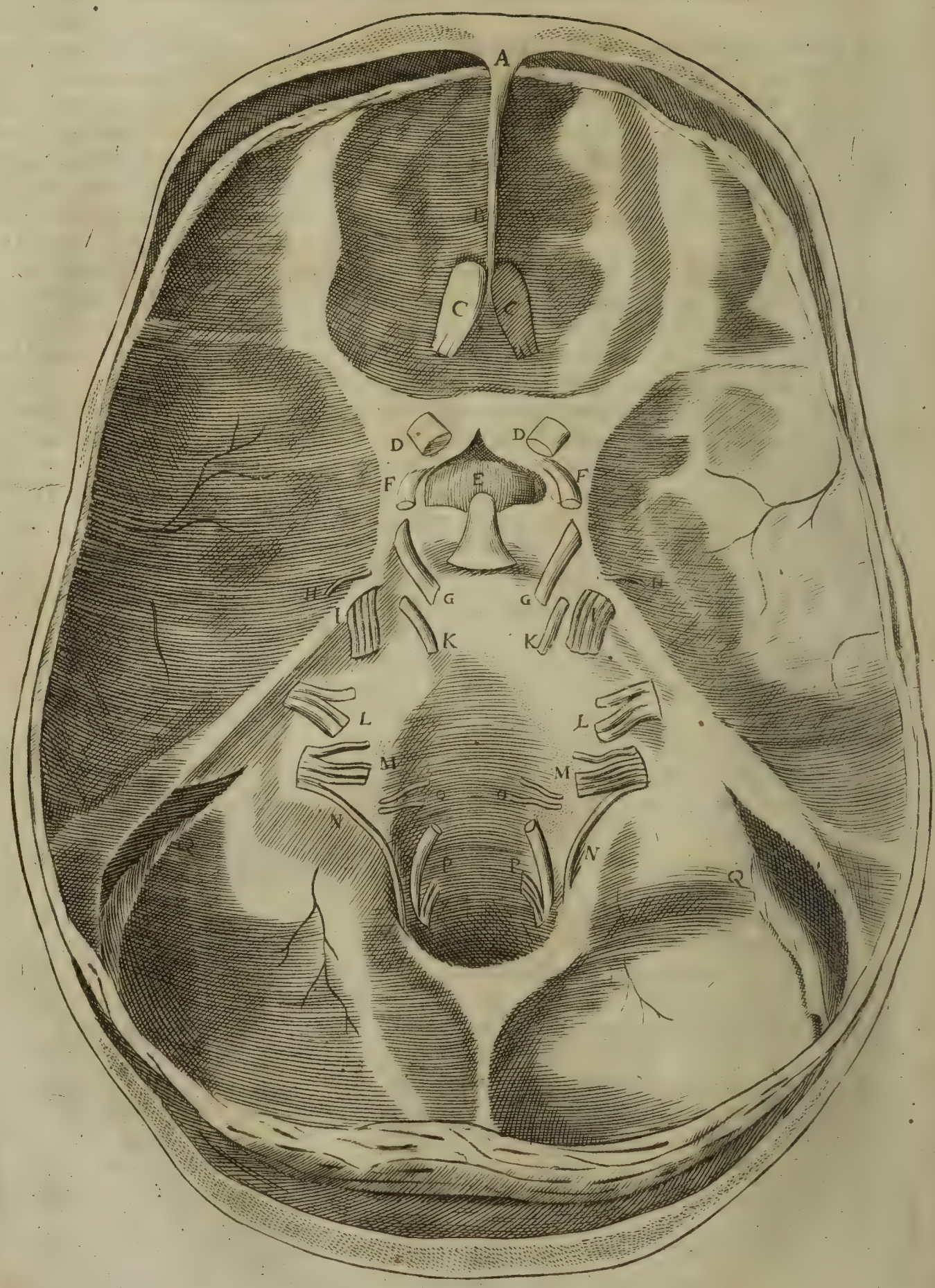


Figura V.



a diſpenſation of the blood within the confines of the Brain. For in as much as the Carotidick Arteries do communicate between themſelves in various places, and are mutually ingrafted; from thence a double benefit reſults, though of a contrary effect: becauſe by this one and the ſame means care is taken, both leſt the brain ſhould be defrauded of its due watring of the blood, and alſo leſt it ſhould be overwhelmed by the too impetuous flowing of the ſwelling ſtream or torrent. As to the firſt, leſt that ſhould happen, one of the *Carotides* perhaps being obſtructed, the other might ſupply the proviſion of both; then, leſt the blood ruſhing with too full a torrent, ſhould drown the chanels and little Ponds of the brain, the flood is chaſtiſed or hindred by an oppoſite Emiſſary, as it were a Flood-gate, and ſo is commanded to return its flood, and haſte backward by the ſame ways, and to run back with an ebbing Tide.

By this kind of proviſion the Arteries about to enter the Brain are provided: yea, and the paſſages of the Veins, deſtinated for the returning of the blood from thence, ſeem alſo to be diſpoſed with a wonderful artifice. For when the anterior boſoms transfer their load into the two Laterals, which are the poſterior, and they themſelves end in the Jugular Veins, it is obſerved, that thoſe latter boſoms have furrows or cavities inſculped whereby they may ſettle or reſt upon the hinder part of the Head: and whenas either boſom, through a proper hole, being about to go into the Jugular Vein, ſlides out of the Skull; nigh that hole, in the outward part of the Skull, a round and ample den is made hollow, and covered over by the extremity on either ſide of the ſame boſom, inlarged into a greater capacity, to the end, that the blood, whilſt it ſlides forth out of the Head with a full torrent, ſhould not ruſh into the Veins with too rapid and vertiginous an influx, and ſo make a forcible entry on the Heart it ſelf, therefore it hath here a diverſion large enough, in which eſtuating or boiling up, till a more free and open ſpace may be granted to its courſe, it may be ſtaid without any trouble. Certainly there can be nothing more artificial thought upon, and that can better argue the Providence of the great Creator, than this fit or convenient diſpoſition of the blood in the brain, and without it, and the way of its reciprocation in divers Animals, accommodated to the neceſſity of every one. And laſtly, in the diſſection of Beaſts, other miracles of the ſame nature happen, whereby ſhewing the finger and Divine workmanſhip of the Deity, a moſt ſtrong and invincible Argument may be oppoſed to the moſt perverſe Atheiſt.

The Fifth Figure

SHews the interior Baſis of an humane Skull; where is ſhewn after what manner the Veſſels of every kind cut off from the Brain, and about to go out of the Skull, are hid or laid up under the *dura Mater.*

A. *The hollowneſs of the Bone of the Forehead.*

B. *The cloſe or mound of the Cribriform or Sieve-like Bone.*

CC. *The mammillary Proceſſes, which are much thinner, and endued with a leſs open cavity, than in four-footed Beaſts, endued with a more excellent ſenſe of ſmelling.*

DD. *The Optick Nerves, being far ſeparated, go out of the Skull otherwiſe than in moſt brute Beaſts.*

E. *The pituitary Glandula or Kernel with the top of the Tunnel inſerted into it.*

FF. *The Carotidick Arteries ſhewing themſelves nigh its ſides.*

GG. *The moving Nerves of the Eyes going out of the Skull.*

HH. *The pathetick Nerves, hid under the* dura Mater; *go out from the Skull at the ſame hole with the former.*

II. *The fifth pair of Nerves hid under the* dura Mater.

KK. *The ſixth pair ſtretched forth under the* dura Mater, *and go out alſo at the ſame hole with the third and fourth pair.*

LL. *The ſeventh pair entring with a double Proceſs the ſtony Bone.*

MM. *The eighth or the wandring pair ſeen to grow together with an acceſſory Nerve of many Fibres,* NN. *as it goes out of the Skull.*

NN. *The acceſſory Nerve to the wandring pair.*

OO. *The ninth pair.*

PP. *The*

PP. *The tenth pair tending downwards, hid under the* dura Mater, *where the Vertebral Artery aſcends.*
QQ. *The lateral or Side-boſom.*

The Sixth Figure

Shews the Baſis of a Calfs Skull; where is ſhewn after what manner the Veſſels cut off from the Brain, and about to go out from the Skull, are drowned under the *dura Mater.*

AA. *The hollowneſſes of the ſpongie Bone.*
BB. *The mammillary Proceſſes, which, the ſmelling Nerves being cut off, appear hollow.*
C. *The Optick Nerves united, being preſently ſeparated again, they go out of the Skull.*
D. *The pituitary Kernel.*
EE. *The Carotidick Arteries emerging nigh its ſides.*
FF. *The motory Nerves of the Eyes going out of the Skull.*
GG. *The pathetick Nerves of the Eyes, hid under the* dura Mater, *going out of the Skull at the ſame hole with the former.*
HH. *The fifth pair of Nerves demerſed under the* dura Mater.
II. *The ſixth pair drowned under the* dura Mater, *and going out at the ſame hole with the fourth and fifth.*
KK. kk. *The ſeventh pair entring the ſtony Bone with a double Proceſs.*
LL. *The eighth pair, or the wandring pair, with many Fibres, and an acceſſory Nerve, ſeen to grow together, going out of the Skull.*
MM. *The ninth pair.*
NN. *The tenth pair tending downwards, hid under the* dura Mater.

CHAP. V.

The Brains of Fowls and Fiſhes deſcribed.

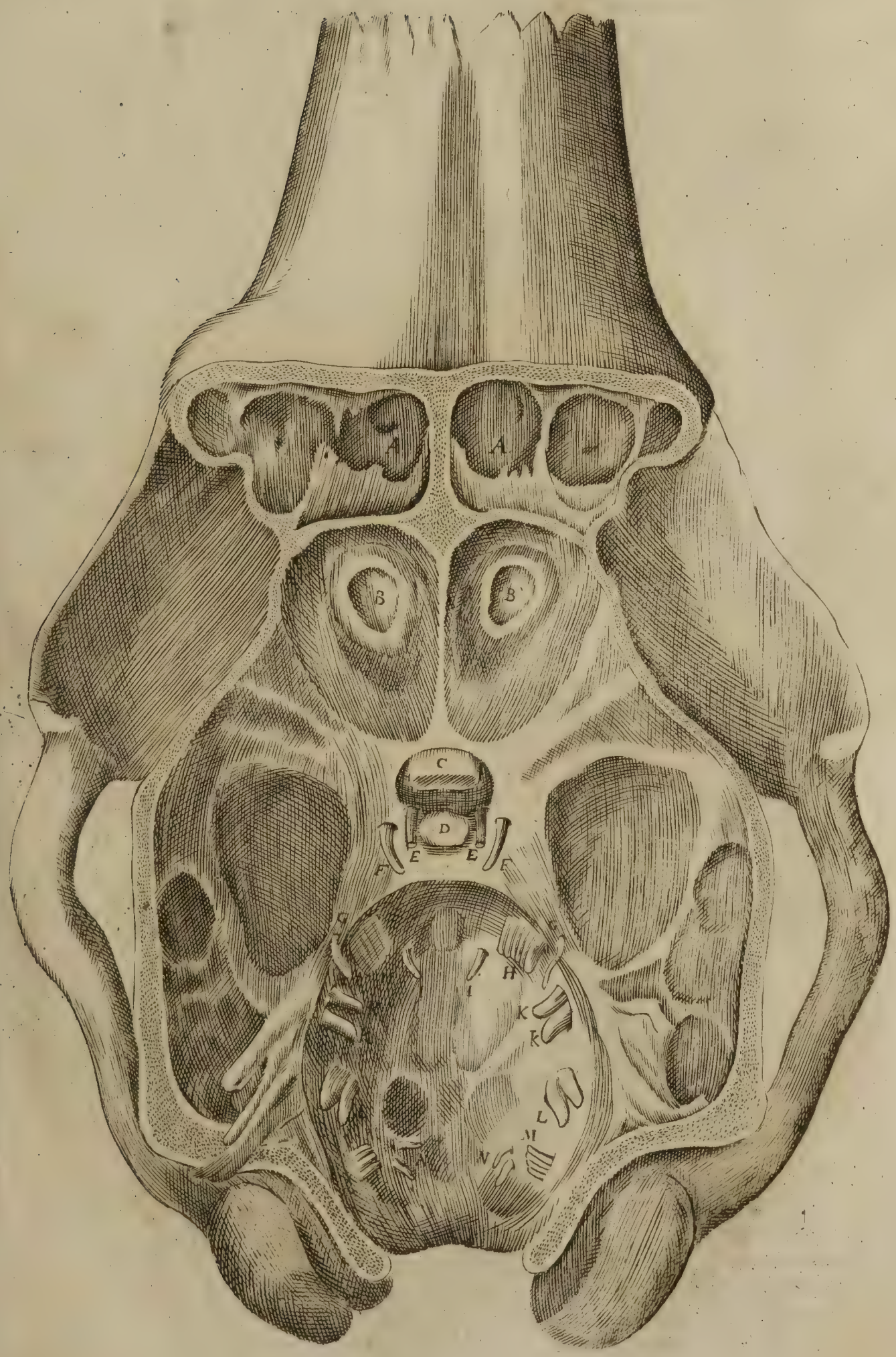
WHat hitherto we have ſhewn concerning the deſcription of the Brain and its Appendix, we chiefly owe to the obſervations made of the diſſection of the Heads of a Man and of four-footed Beaſts. We ſhall now proceed to the commenting upon theſe Obſervations; to wit, that we may endeavour, from the fabrick rightly conſidered of the parts of the Brain, ſo deſcribed, to erect their offices and uſes, and ſo to deſign the government of the animal Function: But becauſe a compared Anatomy may yield us a more full and exact Phyſiology of the Uſe of Parts; therefore before I enter upon this task, it will ſeem worth our labour to inquire into the Heads of ſome other Animals, to wit, of Fowls and Fiſhes.

We have already hinted, that the Brains of Men and of four-footed Beaſts, were alike in moſt things; and alſo that the contents in the Heads of Fowls and Fiſhes being far different from both the former, yet as to the chief parts of the Head, are found to have between themſelves an agreement. The kinds of either Animals being coetaneous, and as it were Twins from the Creation of the World, do teſtifie their affinity in nothing more than in the fabrick of the Brain. That it is ſo in Man and four-footed Beaſts plainly appears already: we ſhall now ſee if that the Anatomy of Fowls and Fiſhes will ſhew us any thing worthy of note.

That we may begin with Fowls; the covering of the Skull being taken off, the hard Meninx or Membrane embraces ſtrictly the bulk or mole contained within. In the midſt of it, where the brain is divided into two Hemiſpheres, it hath a boſom ſtretched out at length, which notwithſtanding, no *Falx* (or Scythe) being let down between the interſtices, is inſerted leſs deeply in the brain: then, where this Membrane diſtinguiſhes between the brain and the Cerebel, two lateral boſoms are formed. Beſides, in Fowls there is a fourth boſom, which hath its place a little more backward than in a man or four-footed beaſts; for a little below the pineal Kernel a hollow and ſmooth proceſs of the hard Meninx is ſent down upon the ſhanks of the oblong marrow, where preſently it is divided into two branches, on either ſide whereof it ſends forth one upwards into the cavity between the ſtreaked Membrane and the

P: 74:

Fig: VI.ª



the Hemisphere of the brain, planted in the hinder part of the brain.

This superior Membrane or hard Meninx being cut off, and separated round about the *Pia Mater*, appears very thin, which is not, as in man or other perfect Creatures, marked with such frequent infoldings of the Vessels; but this most subtil Meninx being made of a texture of Fibres, only clothes, and every where intimately binds about the even and plain superficies of the brain contained within, and wholly destitute of turnings and windings about.

The fabrick of the brain in Fowls is otherwise than in man or four-footed beasts: for besides that in its compass the inequalities and the turnings and windings are wholly wanting; also more inwardly, the callous body and the *Fornix*, as also the chamfered bodies, which we described before, are all lacking: and besides, the substance of the brain it self is figured after another manner. That these may the better be beheld, make the dissection of the brain of a Goose or a Turky-Cock; and the Membranes being cut off, by pressing lightly the fissure or cleft of the brain, you may divide the middle of it one from another, and go forward to separate it, till you come to its bosom, in which place are two marrowy bodies, which being stretched out like Nerves, connect the Hemispheres one to another. Either side of the *Interstitium* or the space between, is clothed with a whitish Membrane, which is marked with streaks or beams, lying or running from the whole compass or circumference, to the lower corner; and these streaks concenter about the insertions of the medullary bodies. Then, if this Membrane be cut, in either Hemisphere of the brain, there will appear underneath a cavity, which goes under the whole space, from the side of the *Interstitium*, and for a great part, the hinder region of the brain, and is arched or chambered with that streaked Membrane. Either cavity or hollowness, about the bottom, is opened into an intermediate or common passage, which lies open to the Tunnel; and from either side of this passage the shanks of the oblong marrow are stretched out, to which, on either side, the Hemisphere of the brain is hung by two medullary bodies; to wit, one marrowy or medullary body goes out from the mole or substance of the brain lying under the Ventricle, the other from the streaked Membrane covering the Ventricle. From these two, placed on either side, the medullary bodies being stretched out cross-wise, like Nerves, joyn the two Hemispheres of the brain to one another. Besides, these two growing together on either side, fix either Hemisphere of the brain to the shanks of the oblong marrow.

So the figure of the Brain in Fowl, if you compare it with the brain in men and of the more perfect four-footed beasts, seems to be as it were inversed. For as in these the Cortical part is outward, and the medullary laid under it; so in Fowls, the lower frame of the brain, which consists of a thick and closer substance, is instead of the *Cortex* or shell; but the outmost and upper Membrane, chambering the Ventricle, appears medullar or marrowy above any other part. Moreover, the Ventricles in the brains of a man and four-footed beasts are placed beneath, and near the bottom; in Fowls, above and nigh the outward border. The reason of this difference seems to be, because in a more perfect brain, such as is in man and four-footed beasts, the animal Spirits have both their birth and exercise; *viz.* they are procreated in its Cortical or shelly part, and in its medullary, which being large enough, lyes under this, they are circulated and variously expanded for the acting of their faculties. But truly in the brain of Fowls there is space enough for the generation of Spirits, but for their circulation there is scarce any left: to wit, the brains of Birds seem not to be much possessed with the gifts of phantasie or memory: yea it is thought, that the Spirits begotten in the brain are exercised chiefly in the oblong marrow for the preserving the animal function; for there, as we shall shew anon, the medullary substance, which is instead of the callous body, consists; and like the streaked bodies in others, in these are streaked Membranes, through which the Spirits, procreated in the brain, are carried, without any order there, forthwith into the oblong marrow: but because the Spirits, begot in the brain, ought to lay aside a serous excrement; therefore the Ventricles, from the complicature of the streaked Membrane upon the keel or lower part of the brain, and on the shanks of the oblong marrow it self, do serve conveniently enough for this business. Notwithstanding, because in the brains of Fowls, the *Fornix* is wholly wanting, there are only two anterior Ventricles; between which, the Choroeides infolding is stretched out; the veinous portion whereof, as was but now said, arises a little lower from the fourth bosom; but the Arteries ascending, come from either side of the oblong marrow.

Nor

Nor is there a greater heterogeneity or difference of conformation in the Brain it ſelf of Fowls, than in the oblong marrow from the ſame in men and four-footed beaſts. For in the firſt Section, from whence the Optick Nerves ariſe, two noted protuberances grow to either ſide. Theſe are much greater in proportion than the orbicular prominences in the more perfect Creatures; ſo that they ſeem another additional brain: either of them of a white colour, and purely marrowy, is hollow within; ſo that in theſe kind of Animals are found two bellies or Ventricles in the brain, and as many in the oblong marrow. And ſeeing in theſe, as in all other Animals, a cavity is put under the Cerebel, the Ventricles in the whole Head differ as well in number as in figure and poſition.

In the middle of the medullary Trunk, to wit, where thoſe prominences grow to its ſides, the Chink, leading to the Tunnel, is cut, but into it the aperture of either Ventricle gapes or opens, that it is not to be doubted, but that the ſeroſities heaped up there, are ſent out by that way. Moreover it is likely, that theſe hollow and medullary prominences in Fowls ſupply the courſe of the callous body, to wit, in which the animal Spirits are circulated for the exerciſing their faculties: becauſe in the brain the ſpace is ſo narrow, that the Spirits cannot be produced and circulated together within its confines. Further, as in Fowls, the uſe of the animal Spirits is required for the act of the ſenſitive and loco-motive faculty, more than for phantaſie or memory; certainly the chief place where they may meet and be exerciſed, ought to be placed rather in the oblong marrow than in the brain.

The Carotidick Arteries, which carry the blood to the brains of the greater Birds, are ſo ſmall, that there is no proportion of theſe to the ſame in man and four-footed beaſts. Their Trunks being carried within the Skull, aſcend without any branchings into net-like infoldings, after the ſame manner as in other Animals, nigh to the pituitary Glandula, and paſs right into the brain, and diſtribute ſome ſmall ſhoots of the Veſſels both to its exterior compaſs, and through its inward receſſes. But in truth, the brains of Birds are watered with a very ſmall portion of blood, in reſpect of other living Creatures; becauſe, where the fancy or imagination is little exerciſed, there is not much blood required for the refreſhing the animal Spirits.

Fowl (otherwiſe than ſome affirm) have both the mammillary proceſſes, and the Cribrous or Sieve-like bone. For the anterior productions of the brain being highly extenuated and involved with the *dura Mater*, ſtretching out almoſt to the middle part of the bill, are inſerted into the triangular bone, which hath a double boſom, diſtinguiſhed between with a thin mound or pale. But theſe proceſſes being dilated within the boſom of the aforeſaid bone, and in Bladders full of clear water, which are very like the mammillary proceſſes in a Calf, full of clear water. Beſides, as out of the fifth pair of Nerves, a noted branch on either ſide paſſing through the ball of the Eye, enters into the cavern of the Noſtril, a ſhoot of it being ſent out of the Trunk, is beſtowed to the very orifice of the Noſtrils; in the mean time, both the greater Trunks, compaſſing about the Cribrous bone, meet together, and preſently going one from the other, and being carried to the end of the bill, are diſtributed into the palate. After this manner Fowls, even as men and four-footed beaſts, are furniſhed with a peculiar organ of ſmelling, to wit, with a double mammillary proceſs; and beſides, they have within the Noſtrils additional Nerves out of the fifth pair, by whoſe action and communication of branches into other parts, and among themſelves, ſo ſtrict an affinity is contracted between the ſmell and the taſte. The other pairs of Nerves are almoſt after the ſame manner as in men and four-footed beaſts. In like manner we alſo obſerve, that there is no great difference as to the Cerebel and the other portion of the oblong marrow, between Birds and the other Animals we have already conſidered on, unleſs that the orbicular prominences before the Cerebel, and the other annulary under it, meeting within them, are both wanting in Fowls; indeed theſe latter ſeem not at all to be required; but inſtead of the former, they are eaſily ſupplied from the hollow medullary prominences, ſuch as we have ſhewn to be in Fowls.

And theſe are what are chiefly worth noting to be found in the brains of Fowls. We have already mentioned, that there is a certain likeneſs between theſe and Fiſhes as to the moſt parts of the head: wherefore it will ſeem to be to the purpoſe, that here for a concluſion we ſhould ſay ſomething of the brain of Fiſhes. Firſt, we ſhall obſerve, that as the heads of Fiſhes, in reſpect of the whole body, are greater than of any other living Creatures, yet they contain in them leſs brain than others. For

two

two little moles or ſubſtances, placed before, ſuſtain the whole place of the brain, properly ſo called; out of theſe, two ſignal ſmelling Nerves proceed, which are carried by a long and ſtraight journey to the holes made hollow, out of either ſide of the mouth, and which are inſtead of noſtrils: and this is ſingular to Fiſhes. Moreover, we advertiſe concerning the Optick Nerves, that they, as in other living Creatures, inclining mutually one to the other, are not however united, unleſs perhaps towards the ſuperficies; but they are croſſed, and a Nerve ariſing from the right ſide of the oblong marrow, is carried into the left Eye, and ſo on the contrary: ſo indeed, that the viſory rays have their refraction, not only in the Eye, but within the very bodies of the Nerves. The oblong marrow in Fiſhes, wholly after the like manner as in Birds, hath two ſignal protuberances hollowed within; and in truth, as to local motions, the Spirits in either ſeem to the exerciſed after the like mode. For as Fiſhes ſwim in the water, ſo the flying of Fowls or Birds ſeems a certain kind of ſwimming in the Air. Further, in theſe 'tis obſervable, there are the pituitary Kernel, the Tunnel, and the Carotidick Arteries as in other Animals; alſo many pairs of the Nerves have the ſame origines and diſtributions, excepting that the hearing Nerves are here wanting; although *Caſſerus Placentinus* attributes this gift to the ſmelling Nerves. The figure of the Cerebel is the ſame as in more perfect Animals. Beſides, what we have remarked concerning the wandring pair of Nerves in man and four-footed beaſts; to wit, many fibres of it ariſing together, the trunk of the Nerve from the ſpinal marrow comes to them: in like manner the ſame is in Fiſhes. But to deſcribe them all further is needleſs: for the reſt, as thoſe which are proper to them only and Birds, as alſo thoſe which they have common with Fowls and the more perfect Animals, may be eaſily known, partly out of the peculiar ſimilitude with birds, and partly out of the univerſal Analogy of all. Therefore we will now philoſophiſe upon the Uſe and Action of the Brain and its Parts, and of its Appendix, together with the whole œconomy of the animal Function: where in the firſt place, we will inquire into the offices of a more perfect Brain, ſuch as of man and four-footed beaſts; and alſo ſecondarily and collaterally we ſhall explain the Offices and Actions of a leſs perfect Brain, and of its Parts, ſuch as that of Fowls and Fiſhes.

CHAP. VI.

Of the Offices of the Brain and its Parts: where firſt of all the Uſes of the Skull and the hard Meninx or Dura Mater *is treated of.*

THE Poets feigned *Pallas* to be formed within the Brain of *Jupiter*, and from thence to be born. In truth, within the Womb of the Brain all the Conceptions, Ideas, Forces, and Powers whatſoever both of the Rational and Senſitive Soul are framed; and having there gotten a ſpecies and form, are produced into act. Wherefore it will be worth our labour to inquire into theſe places, of the generation of theſe more noble faculties, and the firſt riſe and primitive beginnings of them, as alſo more curiouſly to conſider the divers parts of the Brain, or the Organs ſerving to their Generation: And I go about this part of my labour the more willingly, that I may by handling the thread of our diſſection again, bring all the Phænomena, before given to our inſpection and ſenſe, before the Eye of Reaſon, and to be again weighed by a more ſevere Examination of Diſcourſe; at leaſt thoſe things which ſeem to be of the greater moment, and chiefly worth taking notice of. Neither do we think here to heap up into a great Volume the ſeveral things worn out by the handling of others, and offered to common obſervation.

Therefore recollecting the Anatomy of the Brain, the firſt things to be conſidered are its coverings, to wit, the Skull, and the two Meninxes or Maters. Concerning the firſt it is obſerved, that all perfect Animals have an hard and bony Skull. A double reaſon for which may be given: Firſt, that the Head being deſtinated for the moſt noble uſe, might be protected with a more firm and not eaſily penetrable covering, as a natural Helmet, againſt the injuries of external ſtrokes; beſides ſecondly, as this is in the place of Armor, ſo alſo of a Cloiſter; becauſe the ſame covering the *dura Mater* within, may reſtrain and keep within the Brain the Effluvia's of the animal

mal Spirits, leſt they ſhould too thickly evaporate, or in heaps. Further, as the Skull for theſe ends is made bony, the efficient cauſe are the ſaline Particles of the blood watering the brain, which being unprofitable to the interior work of the animal Spirits, and ſo to be ſent away outwardly, grow together thus in the circumference, and are congealed into a ſtony hardneſs: For indeed the blood being carried towards the Head, as it abounds very much in Spirit, ſo in Salt; its Particles highly volatile, being joyned to the Spirits, are beſtowed on the brain; in the mean time, the ſaline little bodies, which are of a more fixed nature, being thruſt out into the circumference, from the Spirit implanted in the Brain, conſtitute the ſtony Skull, as it were a bubble covering incloſed wind.

Within the hollow ſuperficies of the Skull, there appear many furrows and inequalities imprinted by the protuberances of the Veſſels; and we perceive frequently either border or plate of it to be perforated by the paſſing through of the Veſſels in ſeveral places: but the Arteries, ariſing in the exterior ſuperficies of the *dura Mater*, make theſe kind of little ditches through the concavity of the Skull. For when the whole ſubſtance of the brain is at firſt ſoft, and eaſily giving place, like Wax; the Arteries underneath it continually beating, as it hardens by degrees, eaſily imprint the marks of their tracts.

The figure of the Skull in four-footed beaſts is narrow and preſt down, but in man, the ſubſtance of whoſe brain is large, there is required a more capacious and almoſt ſpherical figure. For as God gave him an upright countenance to behold the Heavens, and alſo endued his brain with an immortal Soul, and fitted for the ſpeculation of Heaven; therefore his face is erect or lifted up: ſo the brain it ſelf is placed in a more eminent place, to wit, above the Cerebel and all the Senſories. But in Brutes, and ſuch whoſe faces are prone towards the Earth, and have a brain unfit for ſpeculation, the Cerebel, however ſerving to the more noted action and office of the Præcordia, is placed in the higheſt ſeat to which the mole of the brain is ſubjected. Beſides, ſome organs of the Senſes, to wit, the Ears and Eyes, if they be not ſuperior, they are placed at leaſt equal to the brain. In an humane Head, the Baſis of the Brain and Cerebel being placed nigh together, yea of the whole Skull, is made parallel to the Horizon; whereby it comes to paſs, that there is leſs danger for any portion of the Head to be jogged here and there, or to be moved out of its proper ſeat: But in four-footed beaſts, who go with an hanging down head, the Baſis of the Skull makes a right angle with the Horizon; wherefore the brain being ſubjected, the Cerebel is put in the higheſt place; ſo indeed, that this ſeems leſs ſtable, and that it may ſhake, or be moved from its ſeat. However againſt this inconvenience, leſt a frequent concuſſion of the Cerebel might induce a ſinking down or loſs of the Spirits, or irregularities about the Præcordia, in ſome it is taken care of by a wonderful artifice of Nature; for as in all the frame or ſubſtance of the Cerebel is moſt ſtrictly bound faſt together by the *dura Mater*, beſides in ſome it is ſtaid by a bony fence; but in others, as in a Hare, Rabbet, and other leſſer Brutes, a certain portion of the Cerebel is included on either ſide by a ſtony bone, and ſo by this double hold its whole bulk or ſubſtance is firmly tyed to the Skull. Concerning the chief bones of the Skull, *viz.* the Cuniform or Wedge-like bone, the Cribrous or Sieve-like bone, and the auditory or hearing Organ, they ſhall be ſpoken of in their proper places, when we come to treat particularly of the Ventricles of the Brain, and of the Senſes to which theſe bones ſerve. We ſhall paſs next to the hard *Meninx* or *dura Mater*.

The *dura Mater* or hard Meninx, formed of a double kind of Veſſels and Proceſſes, bears alſo a double Aſpect, and owes part of its office to the Skull, that is about it, and part to the *Encephalon* contained within it. The exterior proceſſes of this Membrane are inſinuated within all the boſoms and cavities of the Skull; to ſome whereof they are a covering and defence, but to others they impart a ſenſible force; which manifeſtly appears in the Sieve-like bone, through whoſe holes the fringes of this Membrane paſſing, conduce ſomething to the ſenſe of ſmelling. Alſo the productions of this, lying over the receſſes and caverns of the Wedge-like bone, fortifie the ways for the entrance and coming out of the Veſſels. The interior proceſſes of the *dura Mater*, which belong to the Head, divide and diſtinguiſh between the parts of the brain and Cerebel; and in thoſe places the *dura Mater* is very thick, leſt in any great concuſſion of the Head, theſe two ſhould be ſmitten one againſt another, and ſhould preſs one upon the other. Wherefore in Dogs (as we have already hinted) who are wont to run violently with their heads down, there is ſent down between theſe bodies

bodies a bony fence. In like manner in a Cat, Horſe, Fox, and many other Animals, from whoſe manner of living and uſe it is required, that they be moved with a ſwift motion, that bony fence, commonly called the Triangular Bone, is ſent down deeply between the Brain and the Cerebel; yea, and all the boſoms paſs through that bone in the holes curiouſly made hollow in it.

The Veſſels belonging to the *dura Mater* are either Arteries, that carry the blood thither; or they are Veins, which receiving from thence the ſuperfluous blood, and from the whole Head beſides, return it towards the Heart. As to the firſt ſort of Veſſels, on either ſide, two Arteries ariſing from the Carotidick Artery on the ſame ſide, before it comes to the Baſis of the Brain, are carried into the *dura Mater*: which notwithſtanding, only poſſeſſing the exterior ſuperficies or convex part, carry blood and juyce to this Membrane, alſo in ſome meaſure to the Skull and its coverings. As to the Veſſels carrying the blood back, this Meninx contains four, into which, as into a great Sea, all the Rivulets of the Arteries, ſerving the whole Head, do exonerate themſelves: to wit, there are obſerved in this Membrane four noted Cavities, commonly called Boſoms; which are diſpoſed after that manner, that, like Promptuaries or Store houſes framed in ſeveral places, they receive the blood returning from every region and corner of the brain: For the third boſom, or the longitudinal, looks towards the anterior brain, the fourth towards its middle; but the firſt and ſecond admit the blood flowing back from the Cerebel and hinder part of the brain. Further, out of theſe the third and fourth disburden themſelves into the firſt and ſecond; and theſe at length transfer their burden into the Jugular Veins. On every ſide, from theſe boſoms, the leſſer Veſſels, *viz.* the chanels of the Veins are ſent forth, which going out nigh the interior or concave ſuperficies of the *dura Mater*, are preſently inſerted into the *Pia Mater*, and following its protenſion, being diſtributed through the whole compaſs, and all the interior receſſes of the brain and its Appendix within the Skull, and being complicated with the Arteries, receive the ſuperfluous blood, and carry it into thoſe greater cavities. That it is ſo, it plainly appears, becauſe if you ſquirt a liquor, dyed with Ink, into the Pipe of the Artery, that paſſing through the arterious ſhoots, and then the veinous, goes through at laſt into the boſoms.

Whilſt the blood, returning from the whole interior Head, is collected within thoſe boſoms, as with a full belly, it ſeems alſo in another reſpect to be of a very notable uſe; to wit, for the ſupplying of heat, requiſite for the diſtilling forth of the animal Spirits, as if it were a certain Chymical operation. For as much as the blood to be diſtilled, is contained in the Veſſels, interwoven into the *Pia Mater*, the ſuperiour Rivers diffuſed on every ſide through the *dura Mater*, the heat being brought to it like a *Balneum Mariæ*, flow about the underlying blood, and ſo force out of it a moſt ſubtil Liquor into the ſubſtance of the Brain; or rather, the blood raiſing up heat within the boſoms, is like the fire of ſuppreſſion, which in the diſtillation by deſcent, is inkindled round about the Veſſel containing the matter to be diſtilled. For indeed the interior ſubſtance of the Brain, for that it is endued with plenty of Salt and very little Sulphur, is of a more frigid temper: wherefore, that from the blood watering its ſuperficies, the ſpirituous part may be ſtilled forth, and forced into its middle or marrow, the degree of the ambient heat ought to be made the more ſtrong, ſuch indeed, as the blood collected in the ample Eſtuaries of the boſoms, may eaſily afford. Further, as thoſe boſoms being diſtended with heated blood, are like a certain diſtillatory Bath; ſo the other Membrane of the *dura Mater* being ſtretched out about the whole Head, is like an impervious Alembick, which with its covering keeps within the ſpirituous breaths, that they may not be immoderately evaporated.

Concerning this Membrane there may yet be conſidered, with what motion or ſenſe it is endued. And as to ſenſe, 'tis not to be doubted, but that it hath it exquiſitely: For ſince all the Membranes have feeling, and owe that faculty to the afflux of the animal Spirits from the Brain, ſurely this Meninx, for that it is nearer and very much of kin to the Brain and its Appendix, ſo that it clothes very many Nerves going out of the Skull, it obtains a very accurate virtue of feeling: which thing alſo may be argued from the effect; becauſe the pains of the Head often proceed from the breach of unity excited in this Membrane. But that it hath motion, it can hardly be thought, becauſe it is tyed in very many places to the Skull; and yet it is probable, that the ſame may ſometimes, in ſome parts at leaſt, be contracted and wring-

led or drawn together: And certainly there is no doubt, that it is contracted and remitted in sneezing. In like manner, when from an hurt of this a Vomiting or Convulsive motions follow in the *Viscera* or Members, this Membrane is the cause, which being somewhere contracted or divided; infolds with it self the substance contained within with the same Convulsion or Spasm.

Concerning the motion of this Membrane, a curious mind may yet further consider its texture, and especially how it is within the cavities of the bosoms, and the *Interstitium* or separation of the Brain and Cerebel. For in these places are found many Fibres, or as it were greater or nervous cords or strings, such as we have observed to be variously stretched out in the Ventricles of the Heart. Within the bosoms, from the various processes of the Membrane, a cavity full of turnings and windings, and manifoldly divided, as it were with many little Cells, is constituted. This seems to be thus made, to this end, to wit, that the blood returning back from divers little rivers into the cavities of the bosoms, may be retarded by several obstacles, as it were little flood-gates; lest perhaps rushing too impetuously and by heaps, it might flow within this Sea with a vertiginous and inordinate motion. But there is observed, besides these intrications and little cells of this Meninx in the heads of four-footed beasts, that moreover in the whole cavity of the bosoms, very many cords, as it were Ligaments, are every where produced from one side to the other. The office of these is partly, that they may contain the sides of the cavity within their due ends of aperture and dilation, lest they should be distended above measure by the vehement rushing in of the blood, and so may press upon the substance of the brain. Yea the contexture of these whitish Fibres, which are met with, both within the cavities of the bosoms, and in this Meninx, going about the Cerebel, and distinguishing between it and the Brain, seems to intimate, that they serve also to some motion. For it may be suspected, that those strong Fibres, and as it were Ligaments, do sometimes contract, sometimes dilate, and variously draw the Membrane to which they are knit. From these kind of motions of the *dura Mater*, the blood flowing within the bosoms, may be variously agitated, and as occasion serves, sometimes hastened in its Circle, and sometimes restrained or hindred; for in many affections of the sensitive Soul, the blood being disturbed from its equal circulation, is sometimes precipitated by heaps and impetuously to the Heart, and sometimes detained from its nest longer, nigh the confines of the Brain. But that various whirlwinds of passions stir up such irregularities in the motion of the blood, the nervous parts implanted about the *Præcordia*, are in some measure the cause, which by contracting or dilating the same, variously moderate the course of the blood; yet so, that in the mean time, some part of this office is due from the brain it self, or at least to its Appendix. Indeed the brain it self wants motion; but the blood passing through its substance, for as much as it is poured wholly in this Meninx, and passes through its receptacles, is at the motion and beck of this Membrane, sometimes driven away from the brain, and commanded to succour the Heart, as in fear and great sadness, sometimes being hastened towards the brain, is for some time prohibited from flowing back, as in shame, indignation, and some other affections.

Truly, that these kind of interior processes of the bosoms, and as it were transverse strings or cords, do conduce to the more commodious reduction of the blood, we gather also from hence, that in working beasts, whose brain (because they feed and go with a prone and hanging down head) is in greater danger of an inundation of the blood, those processes are very big, for that they being successively contracted, may leisurely thrust out the blood, apt otherwise to stagnate by reason of the inclination of the head. Neither is it from the purpose to observe here, that these same Animals are always furnished, for that reason, with a greater wonderful Net: by which means indeed it is provided, that the blood may not too much invade the brain by heaps; as care is taken by the artifice but now described, lest the same should make too long stay in the brain, and so oppress its more weak frame.

Therefore in the last place, that I may recollect what I have said of the *dura Mater*, and rehearse its chief uses: First, It covers over the Skull within, and reaches to it somewhat of nourishment by the Vessels. Secondly, It is a covering to the whole head, and serves to distinguish its chief parts. Thirdly, It contains the Vessels designed for the reducing the blood from the whole interior head; which, in the mean time, by reason of the plenty of the blood contained in them, and the opportunity of their situation, administer requisite heat for the distillation of the Spirits. Fourthly, It provides

vides ways for the admiſſion and going out of all the Veſſels within the Skull, and fortifies them; to which may be added, that it beſtows on ſome of them their Coats, as ſhall be ſhewn anon. Fifthly and laſtly, This Meninx being here and there contracted or divided by the animal Spirits variouſly moved, according to the paſſions of the Soul, or the neceſſities of Nature, ſtays the blood ſometimes longer near the confines of the Brain, ſometimes drives it forward from thence towards the *Præcordia*.

CHAP. VII.

Of the thinner Meninx or Pia Mater, *of its ſtretching out, as alſo of the Infoldings of the Veſſels every where interwoven with it.*

THE interior *Meninx* or *Pia Mater* is far thinner than the exterior, and conſiſts of a moſt ſubtle contexture of Fibres. This does not compaſs about the *Encephalon*'s ſuperficies as looſly as the *Dura Mater*; but embraces it ſo very ſtrictly, that it is very hardly ſeparated from it: beſides, it inſinuates it ſelf into all its turnings and windings and furrows, and clothes their inward parts. Further, this *Meninx*, although it be thin, yet being covered over throughout with the infoldings of Arteries and Veins, is interwoven with them, and ſo waters all the ſpaces of the Brain and Cerebel with innumerable rivers. For as the Region of either of theſe, eſpecially of the Brain, is full of turnings and windings, this Membrane in like manner grows to the deep furrows of the crankling turnings about, and alſo to the tops of the ridges; yea, the chief complications of the Veſſels are ſtill placed in the vallies, as if they were there hid in regard of their ſafety. Neither doth this *Meninx* only cover the gapings of the turnings and windings about; but alſo gathers together the tops or heights of all their interſtices or places between, and knits them together, and ſo makes the whole ſuperficies of the Head plain, globous, and as it were like the World.

That the diffuſion of this wonderful Membrane into all the turnings and windings of the Brain, and the diſtribution of the Veſſels through thoſe moſt intimate receſſes, may be the better beheld; let the head of a man, or of a brute beaſt that dyed of the Dropſie, be opened: For in ſuch, whoſe brain abounds with much moiſture, the little ſtays, whereby this Meninx is fixed to the ſubſtance of the brain, are looſned, ſo that the Membrane, with the infoldings of the Veſſels, may be eaſily drawn away, and pulled off almoſt whole: which indeed being pulled off, the folds of the brain will appear naked; alſo the inſertions of the Veſſels every where into the more inward ſubſtance of the brain, may be perceived. But to a ſound and dry brain the *Pia Mater* ſticks ſo cloſely, that it can ſcarce be drawn away in any part, or ſeparated with a Penknife.

We have already ſhewn after what manner the Veins and Arteries (which creeping like Ivy, are knit into the *Pia Mater*, and variouſly interwoven into it) cover over with moſt thick little ſhoots, the whole compaſs of the Brain and Cerebel, and their Interſtices, the gapings of the crankling turnings and windings about, boſoms, and cavities, and ſend forth every where ſmall ſhoots into the medullary ſubſtance; ſo that it is not to be doubted, but that the animal Spirits, being as it were ſtilled forth immediately from the blood, every where in the whole head, are received into the Pores and paſſages of the Brain and Cerebel. From hence it will be eaſie to aſſign the uſe or office of the *Pia Mater: viz.* Firſt, this Membrane clothes the univerſal parts of the whole *Encephalon*, and diſtinguiſhes them all one from another. For indeed, this lying over all the gapings and interſtices of the turnings and windings, is inſtead of a mound or fence, by which the animal Spirits are reſtrained every where within their proper cells and orbs of expanſion, nor are they permitted by this means to run beyond their bounds, and ſo confound the acts of the many Faculties. Then ſecondly, this Meninx ſuſtains all the blood-carrying Veſſels, *viz.* both the Arteries and Veins, together with their manifold productions, and ſo affords a paſſage to the blood, by carrying it to and fro towards the brain.

Concerning theſe Veſſels, which are knit to this Meninx, and follow its ſtretching

out into all parts, there are many admirable things to be met with, and highly worthy of note, the uſes and reaſons of which is our purpoſe to ſearch into.

As to theſe, we ſhall firſt obſerve, that theſe Arteries and Veins, otherwiſe than in any other part of the body beſides, not ariſing nigh one another go forth as companions, but going forth from oppoſite ends, meet every where mutually, *viz.* the Arteries aſcend from the Baſis of the Skull, and by creeping through the whole, emit upwards ſhoots and branches, which are met by the Pipes of the Veins ariſing out of the boſoms, and carried downwards. By this means the rivers of the blood ſeem to be made equal every where in the Brain, *viz.* whilſt the ſmaller ſhoots of the Veins follow or match the greater branches of the Arteries, and on the contrary, the ſmall branches of the Arteries the Trunks of the Veins.

Secondly, We have already ſhewn, that theſe Veſſels are variouſly and very much ingrafted or inoculated among themſelves, not only the Arteries with the Veins, but what is more rare and ſingular, Arteries with Arteries; to wit, the Carotidick Arteries of one ſide, in many places, are united with the Carotides of the other ſide; beſides the Vertebrals of either ſide among themſelves, and are alſo inoculated into the poſterior branches of the Carotides before united. The joynings together of the Carotides, in moſt living Creatures, are made about the Baſis of the Skull under the *Dura Mater*, and that after a diverſe manner; in ſome communicated through the Veſſels of the wonderful Net from one ſide to the other; in others (as in a Horſe we have obſerved with a certain admiration) the arterious chanel is produced between the Trunks of the *Carotides*, whereby the blood may be carried from one ſide to the other, and ſo on the contrary. But beſides, between the *Dura Mater*, about the Baſis of the Head, the ſame kind of ingraftings of the Arteries are ſtill ſeen in man and all perfect four-footed beaſts.

The reaſon of theſe ſeems to be partly, that the blood to be carried from the Heart into divers Regions of the Brain, might be exactly mingled as to its parts and particles, before it come to the place deſigned. For the Torrent of the blood, becauſe divided into leſſer rivulets, is incident to languiſh in ſo long a circuit, and its Spirits to be depauperated, and laſtly it ſelf to grow cool; unleſs that various courſes of its *Latex* ſhould anew inkindle this vital flame about to be extinguiſhed or dye.

But there is another reaſon far greater than this of theſe manifold ingraftings of the Veſſels, to wit, that there may be a manifold way, and that more certain, for the blood about to go into divers Regions of the Brain, laid open for each; ſo that if by chance one or two ſhould be ſtopt, there might eaſily be found another paſſage inſtead of them: as for example, if the *Carotides* of one ſide ſhould be obſtructed, then the Veſſels of the other ſide might provide for either Province. Alſo as to the *Vertebral* Arteries, there is the ſame manner of proviſion made. Further, if both the *Carotides* ſhould be ſtopped, the offices of each might be ſupplied through the *Vertebrals*, and ſo on the other ſide the *Carotides* may ſupply the defects of the ſhut up *Vertebrals*.

After this manner, leſt there ſhould be wanting an afflux of the blood at any time in any part of the Brain, or its Appendix, within the Skull, there is care taken with ſingular Art: For as there are four diſtinct paſſages, and thoſe remote one from the other, of this *Latex*, if perchance three of them ſhould happen to be ſhut up, the blood being carried through one only, will ſoon ſupply or fill the chanels and paſſages of all the reſt. Which thing I have found by Experience often tryed, not without admiration and great pleaſure. To wit, I have ſquirted oftentimes into either Artery of the Carotides, a liquor dyed with Ink, and preſently the branches on either ſide, yea and the chief ſhoots of the Vertebrals, have been dyed with the ſame tincture: yea, if ſuch an injection be ſometimes iterated by one only paſſage, the Veſſels creeping into every corner and ſecret place of the Brain and Cerebel, will be imbued with the ſame colour. Alſo in thoſe who have the wonderful Net, the Tincture or dyed Liquor being injected in one ſide, it will come through the Net-like infoldings of the Veſſels in both ſides. Hence it plainly appears, that there is a communication between the Veſſels watering the whole Head; and although every Artery is carried to one only Region, as its peculiar Province, and provides for it apart; yet, leſt that any part ſhould be deprived of the influence of the blood, more ways lye open to every part by the ingraftings of thoſe veſſels; ſo that if the proper veſſels by chance ſhould be wanting in their office, its defect may preſently be compenſated by others neighbouring.

It is not long ſince we diſſected the dead body of a certain man, whom a great

Scirrhus

Scirrhus or hard Swelling within the *Meſentery*, growing at laſt ulcerous, had killed. When his Skull was opened, we beheld thoſe things belonging to the Head, and found the right *Carotides*, riſing within the Skull, plainly bony or rather ſtony, its cavity being almoſt wholly ſhut up; ſo that the influx of the blood being denied to this paſſage, it ſeemed wonderful, wherefore this ſick perſon had not dyed before of an *Apoplexy:* which indeed he was ſo far from, that he enjoyed to the laſt moment of his life, the free exerciſe of his mind and animal function. For indeed, Nature had ſubſtituted a ſufficient Remedy againſt that danger of an *Apoplexy*; to wit, the *Vertebral* Artery of the ſame ſide, in which the Carotidick was wanting, the bulk of the Pipe being enlarged, became thrice as big as both its Pipes on the other ſide: becauſe, the blood being excluded the Carotidick, adding it ſelf to the wonted proviſion of the Vertebral Artery, and flowing with a double flood into the ſame belly, had ſo dilated the chanel of that Artery above meaſure. This Gentleman, about the beginning of his ſickneſs, was tormented with a cruel pain of the Head towards the left ſide. The cauſe whereof cannot be more probably aſſigned, than that the blood excluded from the right Carotidick Artery, when at firſt it ruſhed more impetuouſly in the left, had diſtended the Membrane; and therefore the ſame diſtemper did afterwards vaniſh of its own accord, to wit, the ſuperfluous blood being derived through the Vertebral Artery.

Thirdly, Concerning theſe ſanguiferous Veſſels covering the *Pia Mater*, we obſerve, that the Arteries and Veins, whilſt they meet one another, going out from oppoſite ends, do not only transfer their burden immediately through the ſeveral branches or ſhoots, mutually ingraſted, as is wont to be done in other parts of the Body; but being variouſly complicated and interwoven, do conſtitute every where admirable infoldings, into which, for the moſt part, very ſmall and very numerous Glandula's or Kernels are inſerted. Which thing is ſeen, not only in the infoldings, which are called *Choroeides*, (by which name, beſides thoſe which are found within the plicature or folding up of the Brain, we alſo intend others planted together behind the Cerebel) but theſe kind of infoldings of the Veſſels, with Glandula's ſowed between, are ſeen every where to be ſprinkled through the whole compaſs and interior receſſes of the Brain and Cerebel, and eſpecially between the gapings of their turnings and windings and interſtices. This is clearly manifeſt in a moiſter Brain, or in an Hydropical, where the very ſmall Glandula's, which otherwiſe are ſcarce to be ſeen, being intumified by the moiſture, are eaſily beheld. Moreover, from the aforeſaid infoldings, on every ſide implanted, little ſlender Veſſels, being every where ſent forth, enter the Cortical, and in ſome meaſure the medullary ſubſtance of the Brain and its Appendix; for if you ſquirt into the *Carotides* a black liquor, beſides the ſhoots of the Veſſels, which it dyes every where with the ſame colour, little blackiſh pricks will appear ſprinkled in the ſubſtance of the Brain. Further, if the brain of a living Animal be cut up, the live blood will ſpring forth both from its *Cortex* and medullary part. The reaſon and end of all which, if they be inquired into, it ſeems that theſe foldings of the Veſſels, being variouſly complicated with repeated windings about, as if they were little ſerpentine chanels hanging to an Alembick, through whoſe narrow ſtraits the blood paſſing with a long circuit, becomes ſtill more ſubtil and elaborated; to wit, its thicker part, being by degrees put off in its paſſage, or ſent away by the little branches of the Veins, and ſo at length the only pure and moſt ſpirituous blood, and it ſelf now ready to go into animal Spirits, is admitted within the Pores and paſſages of the brain. But as the blood or ſanguinolent part is ſupped up by the Veins, ſo it's very likely the Serum or watry part is received by the Glandula's or Kernels interwoven in them. For it appears not for what other end theſe Arteries are every where beſet with ſo many Kernels, unleſs they ſhould lay up in them the ſuperfluous ſeroſities. Between theſe infoldings there appear not any Nerves to be found, which may require any juyce or ſerous humor from theſe Kernels; and 'tis not yet found, whether theſe Lymphæducts or Water-carriers be accompanied with any Veſſel: wherefore it may be lawful to ſuppoſe, that whilſt the purer and ſpirituous part of the blood, being ſeparated from the reſt of its maſs, is ſtilled forth into the brain, the ſerous humidities are received by the Glandula's, which are numerous, and that they are for ſome time retained by them, till they may be ſent away into the Veins growing empty again.

Thus far we have beheld only the ſuperior branchings forth of the blood-carrying Veſſels, which are every where interwoven in the *Pia Mater*; and their infoldings, which

which like the leaves of a Wood, or creeping Ivy, cover the exterior compaſs of the whole Head. But by what means, and as it were Chymical Artifice, theſe Veſſels do inſtil the animal Spirits into the Brain and Cerebel, and ſerve for the uſe of one another beſides, ſhall be told anon, after we have conſidered of the inferior Aſpect and next the ground of this moſt thick Wood, *viz.* the greater Trunks of all the Arteries, which are deſtinated for the Brain, where they paſs through the Skull, and ſhew themſelves beyond it.

CHAP. VIII.

Shews with what difference the Arteries in various Animals paſs through the Skull; alſo for what uſe the wonderful Net is made, and the reaſon of it.

THE Arteries, deſtinated to the Brain, are four in number, *viz.* two *Carotides*, and as many *Vertebrals*. Concerning the former, we have already obſerved, that their Trunks paſs through the Wedge-like Bone, as it were with a mechanical proviſion; to wit, either Artery is ſo bowed and intorted in its aſcent, that the blood, before it can reach to the Brain by a repeated ſtopping of ſhores, or hindred by a certain lett or impediment, might flow to it leſs rapidly and more ſlowly. But this is not effected after one and the ſame manner in all Animals: for although the aſcent of the Artery be oblique and intorted in all, yet in ſome, *viz.* in a Man and a Horſe, it being bowed about with a greater compaſs, ſtill enters, even to the Brain, with a ſingle and undivided Trunk: when in moſt other beaſts the ſame paſſes the Skull with a leſſer circuit, and ſliding preſently under the *Dura Mater*, diverſifies it ſelf there into Retiform infoldings, commonly called the wonderful Net. Therefore it ſeems to be to the purpoſe, that we inquire into the various reaſons of this difference.

In the firſt place therefore we ſhall advertiſe you, that the Carotidick Artery in a man enters a little more backward the Skull, than in any other Animal, *viz.* nigh that hole through which the lateral boſom ſlides out of the Skull about to be implanted into the Jugular Vein; for in the reſt, this Artery ariſes within the Skull under the end or acute proceſs of the ſtony Bone. But in an humane Head, the ſame being carried about by a longer compaſs, (that the Torrent of the blood, before it comes to the border of the Brain, might flow ſlowly and pleaſantly with a broken force) attains to the Baſis of the Skull nigh the den made by the ingreſs of the lateral boſom; where being preſently intorted, it enters the proper Chanel inſculped in the Wedg-like Bone, and for the greater aſſurance it is clothed beſides with a thicker additional Coat. This double defence ſeems to be given it, leſt the blood, boiling up too much, and whilſt it is carried violently towards the head, ſhould make a Whirlpool about the ingreſs of the Skull, to wit, where it begins to be wreathed about from its direct aſcent, and ſhould break by its flood the banks of the Belly, unleſs they were more firm. The Artery being ſlid out of the bony chanel, lays aſide alſo its aſcititious or additional Coat; and now being well enough defended within the Skull, goes forward clothed only with its proper Coat, and creeps under the *Dura Mater*, and being as it were depreſſed in the midſt of its paſſage into a valley, being immediately carried out again, it goes on till it comes to the head of the Turky Chair; where again being bent in and intorted, with a certain compaſs, it aſcends ſtraight, and boring through the *Dura Mater*, is carried towards the Brain. The Trunk of this *Carotis*, like a Meander, paſſing through the Skull with a very much bending way or paſſage, is aptly repreſented in the firſt Figure of the following Table.

If the reaſon of this kind of Conformation be inquired into, it eaſily occurs, that in an humane Head, where the generous Affections, and the great forces and ardors of the Souls are ſtirred up, the approach of the blood to the confines of the Brain, ought to be free and expeditious; and it is behoveful for its River not to run in narrow and manifoldly divided Rivulets, which would ſcarce drive a Mill, but always with a broad and open chanel, ſuch as might bear a Ship under Sail. And indeed, in this reſpect,

reſpect, a man differs from moſt brute beaſts, in which, the Artery being divided into a thouſand little ſhoots, leſt it ſhould carry the blood with a fuller chanel, or more quick courſe than is requiſite, makes the Net-like infoldings, by which indeed it comes to paſs, that the blood ſlides into the Brain very ſlowly, and with a gentle and almoſt even ſtream. If that be true, as ſome affirm, that the wonderful Net alſo is ſometimes found in an humane Brain, I believe it is only in thoſe ſort of men, who being of a ſlender wit or unmoved diſpoſition, and deſtitute of all force and ardor of the mind, are little better than dull working beaſts in fortitude and wiſdom.

Secondly, The conformation of the Carotidick Artery in a Horſe, comes neareſt its ſtructure in a man; for in this the Artery enters the Skull alſo lower, and with a greater compaſs than in other four-footed beaſts: which being paſſed, its Trunk being intorted, with a certain compaſs, and then a little depreſſed, goes forward whole to the ſide of the Turky Chair ſtill with a full and broad chanel: which truly ought to be made ſo, becauſe magnanimous and fierce forces are convenient for this Animal, born as it were for War and any dangerous attempts; and ſo there was need, that the blood might aſcend the Brain with a free and plentiful courſe, and (when occaſion requires) with a full Torrent. But though the blood paſſes through the Baſis of a Horſes Skull in the ſame undivided chanel, yet it ought not to come to the Brain it ſelf in one ſingle paſſage; becauſe the frame or ſubſtance of this in a Horſe being far weaker and colder than in a man, it might be overthrown and drowned by the blood ruſhing in by heaps: wherefore the great River of the Artery disburdens it ſelf by two Emiſſaries, and pours out its *Latex* at ſo many diſtinct places of the Brain. Further, as if by this means there were not yet ſufficient caution againſt the Deluge of the Brain, a tranſverſe or croſs chanel, as it were a diverſion, is formed between the chanels of either Artery; through which the blood, being ſtraitned for room, may go aſide, and flow and reflow from one bank or chanel to another, rather than oppreſs or overflow the Brain. Alſo beſides, certain ſhoots being ſent out from the Trunk of either Artery, are inſerted into the pituitary Glandula, the uſe of which is doubtleſs to ſeparate certain ſeroſities of the too watry blood, and to lay them up into that Glandula, whereby the reſt of the bloody *Latex*, to be carried to the Brain, becomes more pure and free from dregs. By what means the Carotidick Arteries, in the head of a Horſe, paſs through the Baſis of the Skull, is repreſented in the ſecond Figure of the following Table. I have not yet had the means to inſpect the brains of a Lyon or a Monkey; but there is reaſon to ſuſpect, that in theſe alſo the Carotides do paſs through the Skull with a ſingle Trunk. In a Sheep, Calf, Hog, yea in a Dog, Fox, Cat, and other four-footed beaſts, which I have hitherto opened, this Artery is divaricated into Net-like infoldings, which Veſſels, for what cauſes and for what uſes they are ſo made, we ſhall now inquire into.

Thirdly therefore, moſt other four-footed beaſts, different from a Man and a Horſe, have the wonderful Net adjoyned to the Carotidick Artery. In truth, this is met with in ſo many, that common Anatomy hath aſcribed it to all Animals, and alſo to man it ſelf. In whom it is found, we obſerve, that the Artery, about to enter the Skull, is not carried about with ſo long a compaſs, but riſing up nigh the hinder part of the Turkiſh Chair, is preſently divided into ſmall ſhoots; yet ſo, as one little chanel is ſtretched right out, which the blood quietly running to, paſſes through without any ſtay, being carried ſtraight into the Brain: but from the ſide of this many rivulets are derived on every ſide, into which the blood impetuouſly aſcending, may be eaſily diverted. Theſe little rivers are partly ingrafted into the veinous paſſages of the ſame, and the Veſſels of the other ſide, and are partly carried into the pituitary Glandula, and partly a compaſs being fetched, are returned into the former chanel or belly of the Artery. That it is ſo, beſides naked inſpection, appears plainly by this Experiment. If below the Skull, an inky liquor be gently and by degrees injected into the Trunk of the *Carotis*, that paſſing through the ſtrait paſſage, is carried preſently into the Brain, nor does it dye the lateral infolded Veſſels with its tincture; but if this liquor be immitted continually and forcibly, preſently running into the folds, it will make black the Veſſels of the ſame and of the oppoſite ſide, alſo entring the hither part of the Glandula and its interior ſubſtance. If the uſe of theſe kind of infoldings of the Veſſels, or the wonderful Net be inquired into, I ſay, that it is made chiefly for theſe ends: *viz.* Firſt, that the Torrent of the blood being divided into ſmall rivulets, its more rapid courſe may be ſo far dull'd or broken, that it may be but leiſurely inſtilled into the Brain. For otherwiſe in labouring beaſts,

who

who go with their heads hanging down, and have but a weak brain, the more free influx of the blood might eaſily overthrow the fabrick of the Brain, and ſpoil the animal Spirits. Secondly, the divarication of the *Carotides* into Net-like infoldings, hath another uſe of no leſs moment, to wit, that the more watry blood being (as it is its temperament in moſt Beaſts, and eſpecially in thoſe who are fed with herbage) before it be poured upon the Brain, might carry away ſome part of the ſuperfluous Serum to the pituitary Glandula, and inſtil the other part into the branches or ſhoots of the Veins to be returned towards the Heart. Thirdly and laſtly, for as much as the Veſſels on either ſide are mutually inoculated by this means, there is care taken both that the blood may be exactly mixed before it aſcends to the Brain, as alſo that more certain ways may be made for its paſſage: becauſe, if perchance an obſtruction ſhould happen in one ſide of the wonderful Net, the blood by that infolding being preſently carried to the other, may find a paſſage: for this cauſe, to wit, that the blood might be the better prevented from any impediment in its paſſage, the Veſſels are not only inoculated under the *Dura Mater* about the wonderful Net, but the Arteries again on either ſide, do the ſame thing as ſoon as they, being knit to the *Pia Mater*, reach the ſuperficies of the Brain, as hath been already ſhewn. By theſe ſort of ingraftings of the Veſſels in the wonderful Net, it comes to paſs, that an inky liquor being injected into one of the *Carotides*, and forced upwards, deſcends by the Trunk of the Artery on the oppoſite ſide, as we have elſewhere obſerved. Some rude draught of the wonderful Net is expreſſed in the third Figure of the following Table.

The Firſt Figure

Shews the aſcent of the Carotidick Artery, and its ſituation within an humane Skull, before it is carried towards the Brain.

A. *The Trunk of the Artery aſcending towards the Skull.*

B. *The ſame, whilſt it is included in the bony Chanel, being clothed with an additional Coat.*

BC. *The incurvature or bending of the Artery, reaching within the boſom of the Skull repreſenting the bending of a double S.*

D. *The Trunk of the ſame being carried towards the Brain.*

The Second Figure

Shews the aſcent of the Carotidick Arteries, and their ſituation in a Horſes Skull.

AA. *Either Carotidick Artery aſcending towards the Skull.*

BB. *The Trunk of either, having paſt the Skull, preſſed down as it were into a valley.*

CC. *The communications of either by croſs Branches.*

DD. *A Branch from either Trunk deſtinated for the* Dura Mater.

dddd. *Little ſhoots on either ſide ſent into the pituitary Glandula or Kernel.*

EE. FF. *Either Carotidick Artery being divided before it reaches the Brain, and aſcending with a double Trunk.*

The Third Figure

Shews the wonderful Net with the pituitary Kernel in a Calfs Skull.

A. a. *The direct Chanel of the Artery.*

B. *The Net-like Infoldings of the Veſſels ſtretched out by that Chanel towards the pituitary Kernel.*

C. *The pituitary Glandula or Kernel.*

The Fourth Figure

Shews after what manner the lateral Boſom goes into the Jugular Vein with a diverting place hanging to it.

A. *The lateral Boſom deſcending.*

B. *That Boſom ſliding into the Skull, and dilating it ſelf into a large and round Cavity, for the receiving of which there is a peculiar Den formed in the outward part of the Skull.*

C. *The*

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Fig: 1



Fig: II

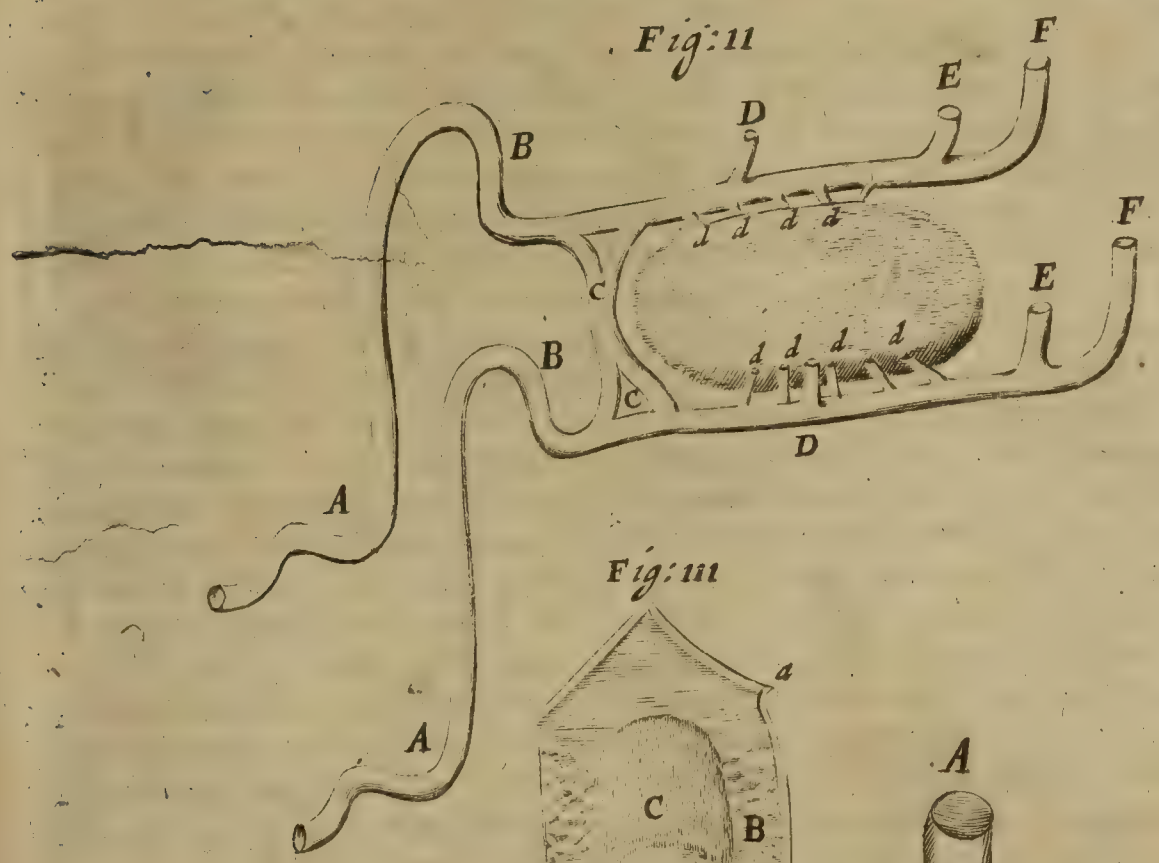


Fig: III

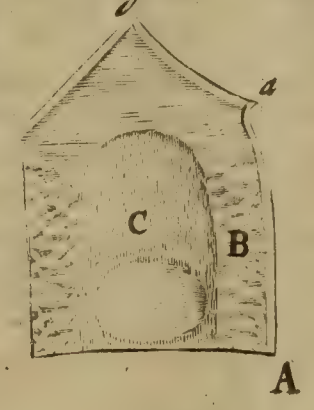
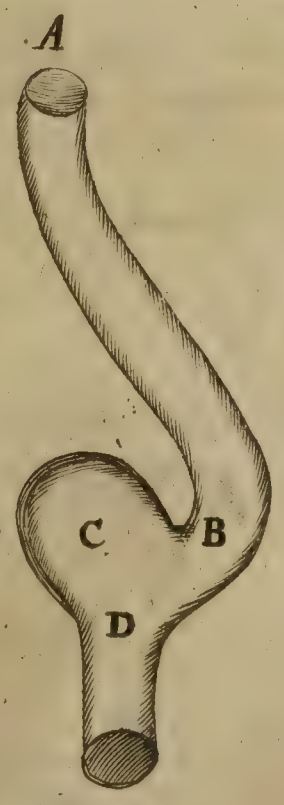


Fig: III



C. *The aforesaid Cavity or diverting place, in which the blood, about to descend, may go aside, lest it should else rush too strongly upon the Jugular Vein; by which also care is taken, that the blood may not flow back or regurgitate out of the Jugular Vein into the Bosom.*

D. *The beginning of the Jugular Vein.*

But as the *Carotides* (of whose office and ascent we have hitherto spoken) carry the destinated Tribute of the blood to the Brain; so the Vertebrals serve chiefly for the watering the Cerebel and the hinder part of the oblong Marrow. Hence we observe, because the conformation of the Cerebel is alike in all Creatures, therefore also the Vertebral Arteries, different from the *Carotides*, are found alike in all without any great difference. Nor does there seem to be need of any great provision for the admission or entrance of the Vertebral Arteries within the Skull; because, as they carry a lesser portion of the blood, and for that the blood it self that is to be bestowed on the Cerebel, is wont there to be agitated or moved with no perturbations of passions or conceptions; therefore there is not that necessity that there should be placed any remora or any incitement for its Torrent.

The Vertebral Artery, arising from the branch in the fifth Rib, in its whole ascent through the hinder part of the Head, passes through the little holes cut in the extuberances of the *Vertebræ*, till it comes near the Basis of the hinder part of the Head; where the same being bent down on either side, and admitted into the Skull by the last hole, excepting where the spinal Marrow goes forth, is carried by the side of the oblong marrow; but as soon as it is brought to the region of the Cerebel, it sends forth branches on either side, which cover its superficies, and besides on its back side make infoldings no less signal than those commonly called the *Choroeides*, and with larger Kernels more thickly interwoven. As *those* shoots convey the Juyce requisite for the stilling forth the animal Spirits, so *these* convey the heated blood and the purified from the serous Colluvies. Further, beneath the Cerebel, both the Vertebral branches, inclining mutually one to another, are united, as it were for that end, that if the flowing of the blood should be stopped on either side, it might be supplied from the other to the whole compass of the Cerebel and its neighbouring parts. These sanguiferous Vessels covering the Cerebel, even as the others do the Brain, make signal infoldings both in its outward superficies, and in that of the oblong marrow, and also within its lappets and folds; from which small shoots are sent forth every where into its under-lying substance: so that from these a subtil liquor, as it were stilled forth and imbibed by the Cortical substance of the Cerebel, seems to go into animal Spirits. By what means, and in what parts of the Head the production of the animal Spirits is performed, remains next to be inquired into.

CHAP. IX.

Shews by what provision, and in what places of the Head the Animal Spirits are begotten: Also other Uses and Accidents of the Pia Mater *are added.*

From the description of the Sanguiducts or Blood-carrying Vessels, which cover and weave about on every side the *Pia Mater*, hitherto handled, we are led by a certain thread to consider by what provision, and in what places of the Brain and its Appendix the production of the animal Spirits is performed.

1. As to the first, it appears from what hath been already said, that the blood is it self the matter out of which the animal Spirits are drawn; and that the Vessels containing and carrying it every where through the whole compass of the Head, are like distillatory Organs, which by circulating more exactly, and as it were subliming the blood, separate its purer and more active particles from the rest, and subtilize them, and at length insinuate those spiritualized into the Brain and its Appendix. Concerning this matter to be distilled, there is care taken, and indeed by the best means, that its stock or provision may be still supplied in fit quality and due quantity.

In reſpect of the quality, from the whole bloody maſs, a portion highly volatile, ſpirituous, and endued with active Elements, ought conſtantly to ariſe towards the Head; which thing ſucceeds partly of its own accord, and partly that it might be more commodiouſly done, care is taken with a certain artificialneſs; to wit, the Vertebral Arteries, in all Creatures aſcending ſtraight, and almoſt perpendicularly, do in a manner cauſe, that only the more ſubtil and light blood is carried upwards, the remaining more thick as it were ſinking down for the baſer offices of the Limbs and of ſome of the Bowels. Yea, alſo the *Carotides* in a man, having an erected head higher than the reſt of the parts, and in a Horſe in ſome ſort lifting up his face, have alſo the ſame priviledge; to wit, that by their more ſteep aſcent only the more pure and volatile blood may aſcend to the region of the Brain. But in other four-footed beaſts, who go with a prone or hanging head, and who have a more frigid and watry blood, which may eaſily ſlide into, and too much waſh the Brain, this evil is in ſome part prevented by the wonderful Net and pituitary Glandula joyned to the *Carotides*; which indeed receive the ſuperfluous humidities of the blood, and ſo make it more pure and free from dregs before it comes to the brain.

But that the blood may be ſupplied ſtill in due quantity, to wit, as it were in weight and meaſure, from the diſtillatory Veſſels, ſtretched about the compaſs of the Head, there is a notable proviſion made in all the *Carotides* about the Baſis of the Skull: becauſe their crooked imbowings and branching into infoldings, hinders the too great or too rapid approach of the blood: then, leſt the paſſage of it ſhould at any time be ſhut up, the mutual ingraftings of all the Veſſels on either ſide, do help or provide for. After this manner, the buſineſs of extracting the animal Spirits is performed even as a Chymical Elixir; to wit, great care is taken in the beginning of that Operation, both that choice of matter may be had, and that only a due proportion of it be expoſed to diſtillation.

The blood by this means, as it were a Chymical work prepared, is carried by the fourfold Chariot of the Arteries to four diſtinct regions of the Head: and as the ſanguiferous Veſſels, being diſtributed with ſeparate ramifications or branches through the whole compaſs of the Brain and its Appendix, cover all the heights of its compaſſings about or gyrations, and alſo all its crevices and their gapings and receſſes, they bring to their doors the matter to be diſtilled into the Head every where through the whole circumference of the Brain and Cerebel nigh the Cortical ſubſtance of either; out of which as the Spirits are diſtilled, by this means it is brought about, that they are inſinuated into the ſubjected ſubſtance of either. The blood being carried through the narrow infoldings and divarications of the Veſſels, as it were (as was ſaid) through the ſerpentine chanels of an Alembick is made extremely ſubtle, as much as may be, in its liquor; in the mean time, what is bloody is received by the little ſhoots of the Veins aſſociates, or meeting one another every where, and what is ~~ſerous by the Kernels every where~~ diſperſed; ~~yet its more purified and ſpirituous part~~ being carried on further through the very ſmall ſhoots ſent forth on all ſides, are inſtilled more deeply into the very Pores and paſſages of the Brain and Cerebel; which preſently flowing from the Cortical ſubſtance into the medullary, there exerciſe the gifts of the animal Function. What peculiar body and conſtitutive particles of the Brain it ſelf and Cerebel, conduce to the generation and perfection of the animal Spirits within the ſubſtance of either, ſhall be ſhewn hereafter, when we treat of the Uſe of thoſe Parts: now ſhall be taken notice of what we before mentioned, to wit, that the fluid extillation of the ſpirituous liquor from the blood about the *Pia Mater*, is performed after a ſignal manner, both from the ambient heat, which is ſtirred up from the blood contained within the boſoms, as it were from a *Balneo Mariæ*, inriched by the continual flowing of it anew, and alſo from the obduction of the Meninges, like an Alembick, by which the ſpirituous Particles, apt to fly away, are conſtrained and forced into the parts beneath.

But indeed, though the animal Spirits are procreated wholly from the blood, yet the blood watering the Brain and its Appendix, is not only beſtowed on this work: for as to the ſanguiferous Veſſels, which ariſing out of the Trunks both of the Carotides and the Vertebrals, cover over the whole Head and all its parts and proceſſes; though many of them, yet not all, are little diſtillatory chanels of the animal Spirits. For the animal Spirits are not produced in all places, to which theſe Veſſels reach; for we affirm, that theſe Spirits are only procreated in the Brain and Cerebel: (which it were eaſie to prove by the Symptoms which happen in the Apoplexy and Palſie, and

ſhall

ſhall be afterwards clearly ſhewn) and from this double fountain of the animal Spirits they flow out into all the reſt of the parts, and irradiate, by a conſtant influence, the whole nervous ſtock. In the mean time, the oblong marrow and its various proceſſes and protuberances are either retreating places, or high roads for the animal Spirits, procreated in the Brain and Cerebel, and flowing from thence. But for as much as the Arteries and Veins clothe theſe parts alſo with a thick ſeries of ſhoots, and that within the infolding of the Brain the folds called *Choroeides* are hung ſlack and looſly, theſe ſeem to be ſo made for other reaſons, *viz.* both that theſe parts might be actuated by heat, ſupplied as it were from a continual fire, and alſo that the nouriſhing Juyce might be beſtowed on the Spirits which flow there.

As to the firſt, that the animal Spirits now perfected, may be freely expanded, and irradiate the nervous *Syſtem*, there ſeems to be required, that the ambient heat, being excited by the blood flowing thither, might open all the little ſpaces for their paſſage, and notably dilate or lay open for them ways or roads: wherefore we intimated before, becauſe the little ſhoots of the Veſſels ought not to be deeply inſerted into the callous body, (for that, leſt the commerce of the Spirits, diverting in this Mart or meeting place, ſhould be diſturbed by the perpetual influence of the blood) therefore the infolding of the *Choroeides* is hung under its chamber, that at leaſt by this nigh ſituation, as by a Stove or Hot-houſe, the heat there might be preſerved. Beſides, we intimated another uſe of this infolding; to wit, that the blood, paſſing through the very narrow *Meanders* and convolutions or rollings about of the Veſſels, might lay aſide its ſerous recrements into the Glandula's or paſſages of the Veins.

2. But ſecondly, That many branches and leſſer ſhoots of the ſame Veſſels, which water the Brain and Cerebel, cover alſo the oblong marrow, and in ſome meaſure enter into its Pores and deeper ſubſtance (within which the animal Spirits are not begotten, but only exerciſed and expanded) I ſay, that this is ſo made for this other reſpect; to wit, that the ſubſtance of the oblong marrow might imbibe a conſtant proviſion of nouriſhment from the pouring in of the blood whereof it hath need. For whilſt the animal Spirits, flowing into the nervous ſtock from the Brain and Cerebel, paſs through this paſſage, as it were the high road, ſome food he e ought to be adminiſtred to them, as it were in their journey, from the watering blood: For indeed we ſuppoſe (which alſo will afterwards clearly appear) that the oblong marrow, together with the nervous parts, is moiſtned with a double humor, *viz.* one ſpirituous and highly active, which flows altogether from the Brain and Cerebel, and being from thence derived into the whole nervous ſtock, beſtows upon them the ſenſitive and moving Faculties; and the other humor ſofter and more oily and ſulphureous, which being ſupplied from the blood, and affuſed immediately on every part, is the Author of their Heat and Vegetation. Both theſe Juyces agree among themſelves, and being every where joyned together and married, they are as it were a maſculine and feminine ſeed mixed together; and ſo they impart to all parts both ſenſe and motion, and all the powers of life and growth. Wherefore it is obſerved, that all the parts of the whole body, by which motion and ſenſe are performed, do not only ſwell up with the animal Spirit, of whoſe influence being deprived, they preſently ſuffer a reſolution or looſning; but alſo they admit the ſanguiferous Veſſels; of whoſe Tribute if they be defrauded, preſently they wither away, or are diſtempered with a mortification or Gangrene. Wherefore, that the fleſh, membranes, and all the bones may be watered with the blood, (as may be perceived by the help of a Microſcope) the very little or minute bodies of ſome of the Nerves are ſurrounded with Capillaments or little hairs of Arteries and Veins, together with their proper Fibrils, that we need not doubt to aſſert, that the Veſſels penetrating the ſuperficies of the *Brain* and *Cerebel*, do diſtil into them a ſubtil matter for the generation of the animal Spirits; but that ſome other ſhoots of the ſame Veſſels, covering the oblong marrow, do only impart to it heat and nouriſhing Juyce. Laſtly, that the infoldings of the *Choroeides* were built under the chamber of the oblong marrow, chiefly for the diſpenſing of heat, and in ſome meaſure for the ſake of ſeparation of the ſerous *Latex*. But concerning theſe, we ſhall have occaſion to ſpeak more largely afterwards, when we ſhall treat of the nutritious and nervous Juyce, and when we ſhall conſider of that famous Controverſie, *viz.* whether nouriſhment is made by the blood or Nerves: further, we ſhall elſewhere ſpeak more fully of the Nature, Hypoſtaſis, and diverſe Diſpoſition of the animal Spirits; alſo, what the ſubſtance of the Brain, and the conformation of the parts, may contribute to their production.

Thus far concerning the *Pia Mater* and the blood-carrying Veſſels, which are woven in it, and following its protenſion, water the whole Head, we have treated largely. But before we quite leave the conſideration of this Membrane, we will inquire what ſenſe and motion it may have. Certainly it is not undeſervedly that we aſcribe the moſt cruel Head-aches to the more acute ſenſe of this; (in which however, by what means this Meninx is affected, does not ſo eaſily appear.) It is the common opinion, that ſharp and tormenting Vapours, being raiſed from the Viſcera of the lower Belly, eſpecially from the Ventricle, Hypochondria, or Womb ſtrike againſt this Membrane, and ſo pierce it with pain. But we ſay, though this be impoſſible, that Vapours paſſing ſo many interſtices and bars of the Viſcera and bones, without any trouble, ſhould ever come to the Head and hurt it: yet we do not deny, but that ſometimes vaporous Effluvia's do proceed from the blood boiling or eſtuating within the confines of the Brain, which being ſhut up together under the *Pia Mater*, and as it were gathered into a Cloud, do greatly blow up and diſtend it, and ſo diſtemper it with pain. I have often ſeen, in a Head newly opened after death, the *Pia Mater* diſtended, and ſhining like a Bladder, that the ſame ſeemed to be intumified, with much water included under it; which notwithſtanding was found to be ſo done by wind diſtending the Membrane, for that being diſſected, that Tumor fell down without the effuſion of water.

But we think the Head-aches, which happen by reaſon of the evil of this Membrane, are chiefly excited by another means, to wit, for as much as this Meninx ſuffers a breach of the unity by the blood boiling up above meaſure, and ruſhing into its Pores, and ſo it is contracted into lighter Convulſions. I have ſometimes opened the Heads of the defunct, which when living, were obnoxious to moſt miſerable Head-aches; in which, near the longitudinal boſom, where the ſeat of the pains was, the *Pia Mater* or interior, grew to the *Dura Mater* or exterior for ſome ſpace, oft-times for two fingers breadth, and by their growing together had excited a ſharp and unequal Tumor; in which the mouths of the Veſſels were ſo wholly ſtopped up, that there was left for the blood, though very much boiling up, no paſſage into the adjoyning boſom.

As to the motion of this Membrane, we wholly deny, that it hath in it ſelf a perpetual Syſtole and Diaſtole; however, the Pulſes in ſome Arteries, have ſeemed ſomething like it, which have given occaſion perchance to this vulgar Opinion. Yet in the mean time, it may be lawful to believe, that this Meninx, for that it is very ſenſible, is rendred obnoxious to Cramps and convulſive motions: and that from its greater contraction the fits of the Falling-ſickneſs do ariſe, and from its leſſer and more partial corrugation or wrinkling together, Head-aches, as hath been ſaid, and alſo ſometimes Scotomies, Vertigoes, and often Convulſions of the Members and Viſcera, planted at a great diſtance from the origine of the Nerves, being drawn into conſent.

CHAP. X.

A Deſcription of the Brain, properly ſo called, and the Explication and Uſe of its Parts.

WE have thus far beheld the Coverings of the Brain, both the bony and the membranous, alſo the Arteries and Veins growing and knit to them, like Ivy, and diſtributed through the whole compaſs of the Head. There now remains, theſe coverings being removed, that we next conſider the Fabrick and true Hypotype or Character of the Brain and its Appendix, together with the action and uſe of all the parts. And here at firſt ſight we meet with three things, to wit, the Brain, the oblong Marrow, and the Cerebel: of which the oblong marrow ſeems to be a common Trunk, to which the Brain and Cerebel grow like branches: wherefore ſome contend the medullary Rope to be the principal part, and the Brain and Cerebel its dependences. But that it is otherwiſe appears by this, becauſe theſe bodies, both in the generation and diſpenſation of the animal Spirits, are of more noble

noble uſe than the oblong marrow; ſo that if the out-flowings of the Spirits from the Brain or Cerebel be ſhut up or hindred, the nervous Syſtem preſently ſuffers an Eclipſe; in the mean time, if this be primarily diſtempered, the Brain and Cerebel ſuffer not for its fault.

That we may begin with the Brain, it may be conſidered in a double reſpect; to wit, both as to its convex or exterior ſuperficies, as it is beheld in its proper ſite and poſition; and as to its interior cavity, to wit, as the Brain appears opened, its concave ſuperficies being expanded and turned upſide down. We have already taken care to delineate its true form or Type in either manner, by what hath been before ſaid, to wit, after what manner it is both within and without. There now remains, after its fabrick and conformation being rightly weighed, for us deſign its offices, and to ſhew the uſes of it and of every one of its parts. Concerning which, we ought to unfold in general, firſt, what the office of the whole Brain is, then ſecondly, when we ſhall deſcend to particulars, there will come under conſideration, 1. The diviſion of the Brain, to wit, its double Hemiſphere, alſo the two Lobes or partitions of either. 2. The narrow crankling turnings and windings, or the gyrations and convolutions or rolling together of the Brain. 3. Its double ſubſtance, *viz.* Cortical and Medullary. 4. The common Baſis of all, *viz.* the callous body. 5. Its ſubtenſion or *Fornix*. 6. The appenſion or circuit of the Brain over or above the oblong marrow. 7. And what reſults from thence, the void ſpace or Ventricles made by its infolding together. Concerning theſe, we ſhall take notice of what things occur worth noting; concerning the ſmelling Nerves and their proceſſes, we ſhall inquire afterwards, when we ſhall ſpeak particularly of the Nerves.

1. The Brain is accounted the chief ſeat of the Rational Soul in a man, and of the ſenſitive in brute beaſts, and indeed as the chief mover in the animal Machine, it is the origine and fountain of all motions and conceptions. But ſome Functions do chiefly and more immediately belong to the ſubſtance of this, and others depend as it were mediately and leſs neceſſarily upon it. Among theſe, which of the former ſort are accounted the chief, are the Imagination, Memory, and Appetite. For it ſeems, that the Imagination is a certain undulation or wavering of the animal Spirits, begun more inwardly in the middle of the Brain, and expanded or ſtretched out from thence on every ſide towards its circumference: on the contrary, the act of the Memory conſiſts in the regurgitation or flowing back of the Spirits from the exterior compaſs of the Brain towards its middle. The Appetite is ſtirred up, for that the animal Spirits, being ſome-how moved about the middle of the Brain, tend from thence outwardly towards the nervous Syſtem. The reſt of the Faculties of this Soul, as Senſe and Motion, alſo the Paſſions and Inſtincts merely natural, though they depend in ſome meaſure upon the Brain, yet they are properly performed in the oblong Marrow and Cerebel, or proceed from them.

2. In ſome Animals, the ſubſtance of the Brain is divided into two parts, as it were Hemiſpheres, diſtinct one from another almoſt through its whole thickneſs, even to the callous body, which is inſtead of a bottom; and in like manner alſo in all the Senſories, and in moſt of the other Organs of the neceſſary Functions, the Brain is as it were twofold, that there might be a proviſion made againſt the defect of one ſide by the ſupplement of the other. Further, in man, who hath a brain more large and capacious than other Creatures, either Hemiſphere is again ſubdivided into two Lobes, to wit, the Anterior and the Poſterior; between which a branch of the Carotidick Artery, being drawn like a bounding River to both, diſtinguiſhes them as it were into two Provinces. Certainly, this ſecond partition of the humane Brain alſo ſeems to be deſigned for its greater ſafety; that if perchance any evil ſhould happen to one or both the foremoſt Lobes, yet the latter, for that they are ſeparated, may avoid the contagion of the neighbouring and farther ſpreading evil: So the Brain, like a Caſtle, divided into many Towers or places of Defence, is thereby made the ſtronger and harder to be taken.

3. Alſo the univerſal frame of the Brain appears yet more divided and variegated within all its aforeſaid partitions; for all its whole exterior ſuperficies is made uneven and broken, with turnings and windings and rollings about, almoſt like thoſe of the Inteſtines. Thoſe Gyrations or Turnings going from the fore-part of the Brain towards the latter with a creeping compaſs, and as it were a ſpiral circuit, encompaſſes both its Hemiſpheres, that they might mutually furniſh all the convolutions with a continued paſſage: in a more moiſt Brain, or long kept, the *Pia Mater*, clothing every

every one, and collecting them together, is easily pulled away; and then the turnings or folds being opened and separated one from another, the substance of the brain is seen to be plowed, or laid as it were with furrows; out of which arise banks or ridges of broken crevices, not in a direct series, but cross-wise; so that in the bottom of every furrow, a convolution arising from the right side, is carried to the left, then others following next, being sent from the left side, is drawn to the right, and so by turns the inequalities of the whole brain are variegated in this order.

If it be inquired into, what benefit its Turnings and Convolutions afford to the brain, or for what end its whole anfractuous or broken crankling frame is, we say, that the brain is so framed, both for the more plentiful reception of the spirituous aliment, and also for the more commodious dispensation of the animal Spirits for some uses. As to the aliment to be bestowed on the brain, because it is required to be subtil and extremely wrought or elaborated; therefore it ought to be admitted, not by a more open passage, but only by very small pores and passages. Wherefore that there might be sufficient plenty of spirituous liquor supplied, it is not only drunk in every where in the plain superficies of the brain from its Cortical substance; but that superficies of the brain or Cortical substance is uneven and rough with folds and turnings about; that the spaces for the receiving the Juyce might be enlarged as much as may be: For the anfractuous or crankling brain, like a plot of ground, planted every where with nooks and corners, and dauks and mole-hills, hath a far more ample extension, than if its superficies were plain and even. Further, those cranklings of the brain do more fitly hide the sanguiferous Vessels, for that they are very small and slender, and more safely keep them, being variously interwoven into one anothers infoldings, than if they should be openly distributed; for so being carelessly laid, they would be liable to too frequent hurt.

But a reason and necessity of the turnings about in the brain, and not of lesser moment than the other, is fetched from the dispensation of the animal Spirits. For as the animal Spirits, for the various acts of Imagination and Memory, ought to be moved within certain and distinct limited or bounded places, and those motions to be often iterated or repeated through the same tracts or paths: for that reason, these manifold convolutions and infoldings of the brain are required for these divers manners of ordinations of the animal Spirits, to wit, that in these Cells or Store-houses severally placed, might be kept the species of sensible things, and as occasion serves, may be taken from thence. Hence these folds or rollings about are far more and greater in a man than in any other living Creature, to wit, for the various and manifold actings of the superior Faculties; but they are garnished with an uncertain, and as it were fortuitous series, that the exercises of the animal Function might be free and changeable, and not determined to one. Those Gyrations or Turnings about in four-footed beasts are fewer, and in some, as in a Cat, they are found to be in a certain figure and order: wherefore this Brute thinks on, or remembers scarce any thing but what the instincts and needs of Nature suggest. In the lesser four-footed beasts, also in Fowls and Fishes, the superficies of the brain being plain and even, wants all cranklings and turnings about: wherefore these sort of Animals comprehend or learn by imitation fewer things, and those almost only of one kind; for that in such, distinct Cells, and parted one from another, are wanting, in which the divers Species and Ideas of things are kept apart.

But that in more perfect Animals, all the turnings about are made of a twofold substance, *viz.* Cortical and Medullary; the reason seems to be, that one part may serve for the production of the animal Spirits, and the other for their exercise and dispensation. For we may well think, that the animal Spirits are wholly or for the most part procreated in the Cortical substance of the brain; for this severs and receives immediately from the blood the subtil liquor, and imbuing it with a volatile Salt, exalts it into very pure Spirits. It is obvious to every one, that the Arteries enter the *Cortex* of the brain with a more frequent insertion of shoots, and instil to it a spirituous liquor; the leavings of which, or what is superfluous, the Veins in like manner entring it, do sup up and carry away; in the mean time, the more subtil portion being here set free, goes into Spirits. In truth, the blood waters the medullary substance of the brain in a very small quantity; which seems truly to be rather for the sake of exciting of heat, than that the animal Spirits should there be generated by the flowing in of that blood. For indeed, the volatile Salt, which like Ferment, spiritualizes the subtil liquor stilled forth from the blood, is had more copiously

copiouſly in the *Cortex* of the brain, rather than in its middle or marrowy part; becauſe that part, being endued with an Aſhy colour, ſhews by its aſpect the ſpermatick Particles and Humor contained in them, in which Spirit and a volatile Salt very much abounds; yea and plainly reſembles an Armeniack ſmell, (ſuch as either part alike breathe forth.) In the mean time, the medullary part of the brain ſeems very like the oblong marrow and the ſpinal. But it is well enough known, that theſe medullary parts ſerve for the exerciſe and diſpenſation of the animal Spirits, and not for their generation. The ſign of which is, that where-ever an obſtruction happens in them, whatever is below, being deſtitute of the influx of the Spirits, ſuffers an Eclipſe; whence it follows, that the animal Spirits, irradiating the medullary Rope, are not produced in it, but flow in from elſewhere; and why ſhould not we think the ſame of the middle marrow of the brain? Truly, that this part is rather the Mart or Exchange of the Spirits than its Shop or Work-houſe, appears from hence, becauſe the Animals which excel in Memory, Imagination, and Appetite, are furniſhed with a more ample marrow of the brain; as is obſerved in man and the more perfect four-footed beaſts: and they who ſeem to have little need of thoſe Faculties, as the leſſer four-footed beaſts, alſo Fowls and Fiſhes have the *Cortex* of the brain greater, but the medullary part very ſmall. It is a familiar Experiment among Boys to thruſt a needle through the head of a Hen, and that ſhe in the mean time, whoſe brain is ſo pierced through, ſhall live and be well a long time. The reaſon of which is, becauſe the whole ſubſtance of the brain in theſe ſort of Animals is almoſt merely Cortical; wherefore from the ſuffering ſuch a hurt, (as long as the marrow remains unhurt) the Spirits are generated in a leſſer quantity, but their commerce to the neceſſaries of life, are not therefore preſently interrupted. Indeed the brains of Birds conſiſt almoſt wholly of a Cortical and Aſhy part; and the medullary part is exceeding ſmall, and is only like a ſmaller Nerve deſcending on either ſide from the ſubſtance of the brain it ſelf.

After the animal Spirits are begot by a conſtant afflux of the blood within the *Cortex* of the Brain, being there begotten, having obtained a watry Vehicle, they flow preſently more inwardly, and ſoon enter into the marrows, filling the furrows and baulks of all the turning and winding Crevices; from whence being carried farther through all the particular tracts of each marrow into the marrowy ſubſtance, which lyes under all the winding Crevices, as their common Baſis, they are brought at laſt into the *Callous Body*, as into a ſpacious field; where, as in a free and open place, theſe Spirits being newly produced, are expatiated or iſſue forth.

5. Indeed this medullary ſubſtance called the *Callous Body*, which chambering the more inward ſuperficies of the brain, receives into it ſelf the marrow of all the turning Crevices, ſeems to be made for that end, and diſpoſed there for the ſame purpoſe; to wit, that the Spirits flowing into it on every ſide, might be ſtretched out as in their proper Sphere, and begin to exerciſe the acts of the animal Faculties. In this place, they which come out of the ſeveral winding Crevices, do meet together, and remain as in a publick *Emporium* or Mart; from whence, as occaſion ſerves, they are raiſed up, and drawn forth for the uſes of every Faculty. But whilſt they here remain at leiſure and not buſied, they become purified or refined more and more by a continual circulation: becauſe theſe Spirits new-born, do gently and perpetually flow on every ſide from the outmoſt bounds of this body (to wit, where this common marrow beſmears the hinder productions of the brain, or the border of either of its Hemiſpheres) towards the fore-part of this *callous Body*, where it is thickeſt; and there, if there be need, they are employed on the act of the Imagination, or entring the ſhanks of the *oblong Marrow*, they actuate and inſpire the nervous *Appendix*: but what Spirits are remaining there, after theſe offices are ſerved, run forthwith into the *Fornix*, and paſſing through its paſſage, they are remanded back again to the hinder region of the brain by a certain circulation; and laſtly, after this manner, penetrating through the narrow paſſages of the *Fornix*, thoſe Spirits are made more ſubtil, and alſo, as it ſeems moſt likely, they perform in this circulary motion thoſe more ſubtil acts of the Phantaſie.

6. Truly, that we may here ſpeak ſomething of the *Fornix*, it ſeems that this part ſerves for a twofold uſe: *viz.* firſt, leſt the more inward ſides of the Brain hanging ſlack and looſly, might fall together among themſelves, or might be removed beyond the limits of a juſt protenſion or out-ſtretching; for they, not only by the coming between of the *Pia Mater*, and by little cords drawn from it, cohere to

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the oblong marrow and the Cerebel; but beſides, the *Fornix*, like a Ligament or ſtring brought from one end of the brain to the other, conſtrains and keeps its whole frame in its due figure and ſituation. For this part purely medullar, and of the ſame ſubſtance with the callous Body, ſeems to be a certain proceſs of this, which ariſing more forward between the ſtreaked bodies, and falling upon the two ſhanks of the oblong marrow, firſt of all diſtinguiſhes them; afterwards, being ſeparated from them, is carried through the midſt of the cavity, and about the hinder part of the brain is divided as it were into two Arms, which being bent on both ſides, and again cleaving to the border of the *callous Body*, ſtrictly embrace the oblong marrow, and knit and firmly tye the hinder bulk of the brain to its Trunk, leſt it ſhould flow or ſlide forth. But the other, and that the more noted uſe of the *Fornix* ſeems to be what we but now mentioned; to wit, that the animal Spirits may immediately paſs through its paſſage from one end of the brain to the other, and ſo, as it were through the bill of a *Pelican*, they might be circulated into their own intorted belly.

That thoſe things which were but now declared concerning the *Penetralia* and inward receſſes of the Brain, may be the better underſtood, we will here add a Scheme of its Sphere turned inſide out, and ſtretched out as it were upon a plain, ſo that the concave and inmoſt ſuperficies of the *callous Body*, together with the *Fornix*, may be ſufficiently ſeen.

The Seventh Figure

SHews the Brain of a Sheep bent back and cut a little open in the places where they ſtick together near the ſtreaked bodies, that its interior ſubſtance may be turned the inſide out, and unfolded on a plain.

AA. *The ſubſtance of the Brain cut aſunder, which in its natural ſituation being folded together, did cohere with the reſt of its ſubſtance* a. a. *upon the remaining ſtreaked Bodies.*

B. *The Trunk of the* Fornix *or* Pſalloides *cut aſunder, which in its natural ſite coheres with the Baſis of the ſame* Fornix E.

CC. *The Arms of the* Fornix *which embrace the medullary Trunk on the other ſide of the Pineal Glandula.*

DD. *The brim of the callous Body which embraces the medullary Trunk near the Cerebel.*

E. *The Baſis of the* Fornix.

FF. *Two ſtraight Roots of the* Fornix *lying between the ſtreaked Bodies.*

GG. *The tranſverſe medullary Proceſs knitting the two ſtreaked Bodies one to another.*

H. *The Chink near the Roots of the* Fornix *leading to the Tunnel.*

II. *The ſtreaked Bodies, whoſe Superficies the ſmall Arteries and Veins cover over.*

KK. *The interior Superficies of the callous Body marked with tranſverſe medullary ſtreaks or chamferatings, or reaching from one Hemiſphere of the Brain to the other.*

LL. *The Chambers or hollow places of the Optick Nerves.*

M. *The anterior hole leading to the Ventricle lying under the orbicular Protuberances, which alſo goes ſlope-wiſe to the Tunnel.*

N. *The Pineal Glandula which appears more plain, the* Pia Mater *and the Choroidal infolding being ſeparated and removed.*

OO. *The Natiform or Buttock-like Protuberances, which are here far greater than in a Man or a Dog.*

PP. *The leſſer Protuberances called* Teſtes, *which are additions or things growing out of the former.*

QQ. *The medullary Proceſſes ſtretching from the* Teſtes *into the middle or marrowy part of the Cerebel.*

R. *The meeting together of thoſe Proceſſes.*

SS. *The Pathetick Nerves of the Eyes ariſing out of the meeting together of thoſe Proceſſes.*

T. *The poſterior hole leading into the Ventricle, lying under the orbicular Protuberances, and alſo into the ſame opening of the Tunnel.*

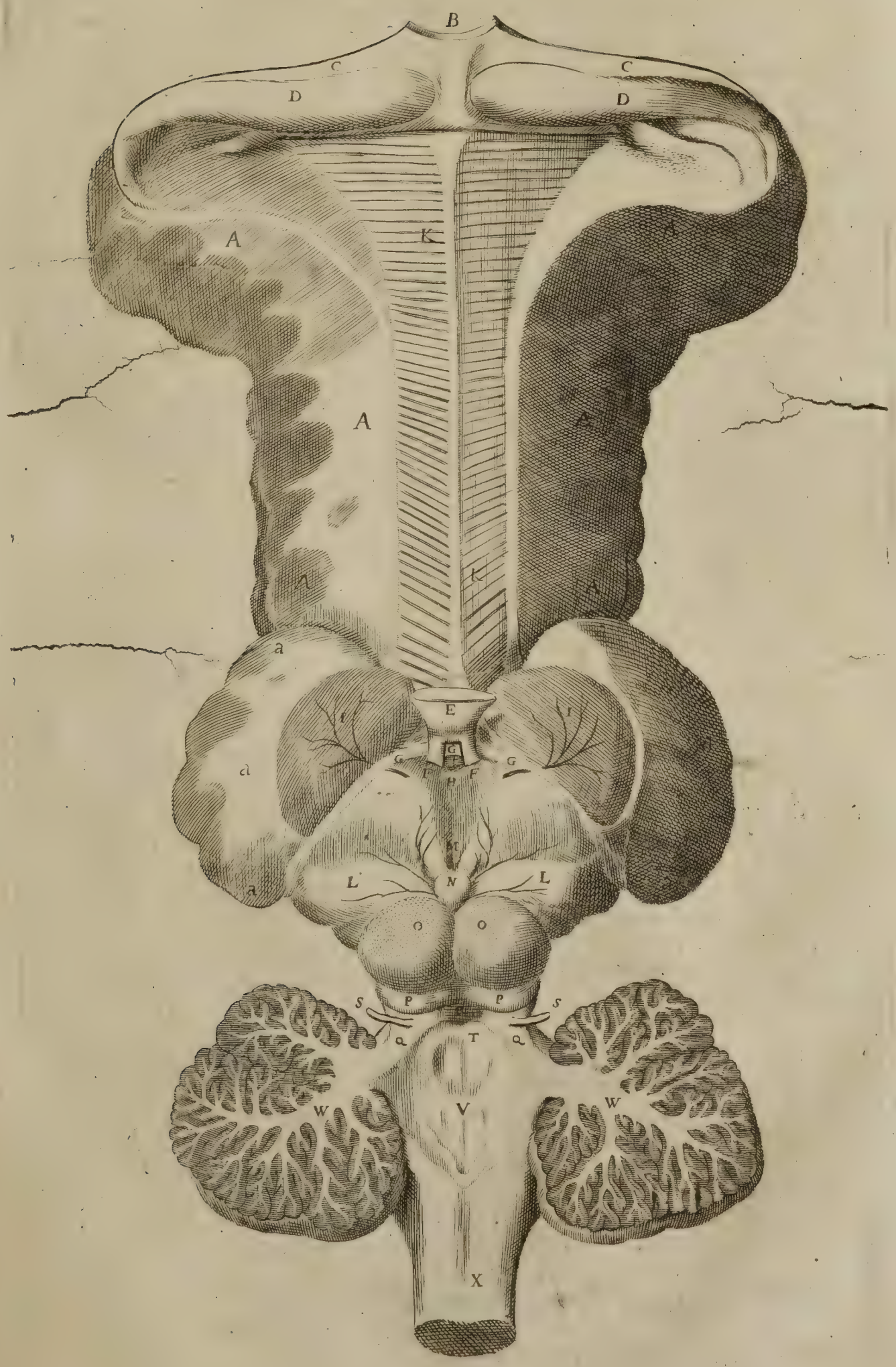
V. *A Furrow in the medullary Trunk, which being covered by the Cerebel, makes the fourth Ventricle.*

WW. *The Ramifications or Branchings of the medullary ſubſtance of the Cerebel, which appear like a Tree.*

X. *The end of the oblong Marrow about to go into the Spinal.*

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Fig: VII[a]



CHAP. XI.

Shews with what motion and tendency of the Animal Spirits the Exerciſes of the Animal Faculties are performed within the Confines of the Brain: Alſo what the uſe of its Ventricles is.

HItherto ſetting forth the uſes and offices of the Brain, properly ſo called, and of its parts, we have ſhewed after what manner the animal Spirits are procreated from the blood in this their principal Shop or Work-houſe; and into what diverting places, they being newly brought forth, do depart of themſelves, and are there kept as it were in diſtinct Cloiſters or Cells to be drawn forth for the manifold Exerciſes of the animal Function. But becauſe theſe Spirits, ſo brought to perfection, and ready for their work within the ſame parts of the Brain, enter into other manner of motions, and divers ways of emanations; therefore before we proceed any further, for the ſearching out their tracts within the oblong Marrow and Cerebel, we ought to declare concerning theſe Spirits diſpoſed within the confines of the Brain it ſelf, with what forces they are furniſhed, in what form they unfold themſelves, and in what ways they diffuſe themſelves and go forward as often as being muſtered in due order, they produce the acts of the Imagination, Memory, Appetite, and other ſuperior Faculties of the Soul. But for as much as hereafter, when we have finiſhed the explication of the Head and nervous Appendix, we have reſolved, for a concluſion, to treat of the Soul of Brutes and its powers, I may therefore for the preſent lay aſide this task; unleſs that in the mean time it may not ſeem amiſs to give a taſte only in general of theſe few things: *viz.* as there are two parts of the inferior Soul, or of Beaſts, to wit, the vital or flamy, being inkindled in the blood, and the ſenſitive or lucid, being diffuſed through the whole Head and its nervous dependences, the animal Spirits being continually produced in the Brain and in the Cerebel, do conſtitute a double as it were Root or Fountain of this lucid part: yea, the Spirits of either linage, for as much as they are continued both within thoſe Fountains, and from thence through the frame or ſubſtance of the nervous Syſtem, as it were under the ſame beamy *Syſtaſis* and contexture, they effect or cauſe the whole *Hypoſtaſis* or ſubſiſtency of the ſenſitive Soul.

But there happen to this Soul, becauſe it is apt to be moved with a various impulſe, and ſo to contract or dilate its ſpecies in the whole, or in part, for that reaſon divers manners both of Actions and of Paſſions, to wit, the Senſes, which we call its Paſſions; and Motions, which we name the Actions of the ſame. The formal reaſon of the former, *viz.* the Senſes, conſiſts in the retraction or drawing back of the Spirits, or a flowing back towards their Fountains. For where-ever the impreſſion of a ſenſible object is carried to this radiant or beamy contexture, preſently either the whole frame, or ſome portion of it, whereby it admits the ſpecies, is compelled to wag, and to be moved back, as it were to leap back and recede into it ſelf: on the contrary, the actions or motions of this Soul are made, for that this ſhadowy Spirit, being incited or ſtirred up in the whole, or in a certain part, unfolds it ſelf more largely, and by an emanation, and as it were a certain vibration of the Spirits, exerts or puts forth its virtue and force of acting.

Both the Senſes and Motions of this ſenſitive Soul are made either tranſient, when the Spirits, or its conſtitutive Particles, being moved ſomewhere in the Syſtem of the Nerves, draw together with them the containing parts, and deflect them with the like carriage or geſture with themſelves, as is obſerved in the five outward Senſes, and the local motions of the Members: or elſe, either both Actions and Paſſions are continuing, to wit, when both the Motions and Senſes are ſilently performed without any great agitation or moving of the body, or its parts, within the firſt Fountains of the Soul, *viz.* the Head it ſelf. Theſe kind of Paſſions indeed, made within the ſubſtance of the Brain, are the common Senſe and Imagination; but the Actions are Memory, Phantaſie, and Appetite: and either of theſe, as to their beginnings and inſtincts, depend for the moſt part upon the outward Senſes.

Concerning the former, we take notice, that as often as the exterior part of the

Soul being ſtruck, a ſenſible impreſſion, as it were the Optick Species, or as an undulation or waving of waters, is carried more inward, bending towards the chamfered bodies, a perception or inward ſenſe of the Senſation outwardly had or received, ariſes. If that this impreſſion, being carried farther, paſſes through the *callous Body*, Imagination follows the Senſe: Then if the ſame fluctuation of Spirits is ſtruck againſt the *Cortex* of the Brain, as its utmoſt banks, it impreſſes on it the image or character of the ſenſible Object, which, when it is afterwards reflected or bent back, raiſes up the Memory of the ſame thing.

The active Powers of this Soul, *viz.* Local Motion, Memory, Phantaſie, and Appetite follow ſometimes immediately the Paſſions, ſometimes are induced apart from them upon other occaſions. For indeed the ſenſible impreſſion ſtriking the ſtreaked or chamfered bodies, oftentimes, the Brain being in no wiſe affected, cauſes the local Motions to be retorted with a reciprocal tendency of the animal Spirits; ſo in ſleep (the Appetite knowing nothing of it) when pain troubles, preſently we rub the place, moving the hand to it: but more often, after that the ſenſible Species, having paſt from the common Senſory to the *callous Body*, hath ſtirred up the Imagination, the Spirits, reflecting from thence, and flowing back towards the nervous Appendix, raiſe up the Appetite and Local Motions, the Executors or Performers of the ſame: And ſometimes a certain ſenſible impreſſion, being carried beyond the callous Body, and ſtriking againſt the *Cortex* of the Brain it ſelf, raiſes up other ſpecies lying hid there, and ſo induces Memory with Phantaſie, alſo often with Appetite and Local Motion aſſociates. Further, theſe active Powers, ſometimes upon other occaſions, are wont to be ſtirred up and exerciſed apart from Paſſion. In Man, the Rational Soul variouſly moves the ſenſitive, and at its pleaſure draws forth and brings into act its Powers, ſometimes theſe, ſometimes thoſe. Moreover, the blood boiling up above meaſure, and by that means ſtriking impetuouſly the border of the Brain, excites the ſpecies of things lurking in it, and driving them forward towards the middle or marrowy part of the Brain, cauſes alſo the various Acts of the Phantaſie and Memory to be repreſented.

Concerning the aforeſaid interior or abiding Faculties, we ſhall at preſent further take notice, that their more perfect Exerciſes are chiefly and almoſt only performed by the Spirits already perfected and highly elaborated; for thoſe a making, or that are new made, being numerous, they very much obſtruct and hinder the acts of the animal Function: to wit, when from the Veſſels, on every ſide watering the *Cortex* of the Brain, the ſubtil Liquor is plentifully inſtilled for the matter of the animal Spirits, this flowing inwardly ſtuffs all the pores and paſſages of the Brain, and ſo excludes for that time the Spirits from their wonted tracts and orbs of expanſion. Wherefore whilſt the chief reflection of the Brain and Spirits is celebrated, ſleep, or an Eclipſe of the animal Spirits happens; then waking returns, when from the Liquor inſtilled, the more ſubtil part is exalted into very pure Spirits, and at length the more watry, being partly reſolved into Vapours, is exhaled, and partly ſupped up by the paſſages of the Veins entring the ſubſtance of the Brain, or elſe is ſweat out into the vacuity lying under the callous Body. Concerning theſe I hope we may diſcourſe more largely afterwards. In the mean time, that we may proceed to the reſt of the things propoſed, concerning the frame of the Brain, properly ſo called, there yet remains that we ſpeak of its Ventricles: But ſince they are only a vacuity reſulting from the folding up of its exterior border, I ſee no reaſon we have to diſcourſe much of their office, no more than Aſtronomers are wont of the empty ſpace contained within the vacuity of the Sphere.

But in truth, as there is nothing met with in Nature that is not deſtinated to ſome uſe, ſurely we ſuſpect this ſame *Vacuum* or empty ſpace not to be built in vain within the Globe of the Brain. The Ancients have ſo magnified this Cavern, that they affirmed it the Shop of the animal Spirits, both where they themſelves were procreated, and performed the chief works of the animal Function. But on the other ſide, the Moderns or thoſe of later days have eſteemed theſe places ſo vile, that they have affirmed the ſame to be mere ſinks for the carrying out the excrementitious matter. But indeed that opinion of the Ancients is eaſily overthrown, for that the animal Spirits, being very ſubtil, and apt to fly away, require not ſuch large and open ſpaces, rather than the more narrow paſſages and little pores, ſuch as are made in the ſubſtance of the Brain: for theſe Spirits (becauſe they ought, for the various Faculties of the Soul, to be compoſed into various ſeries, and divers orders and diſpoſitions, therefore)

ought

ought to be moved within peculiar orbs and tracts. Further, if any one shall exactly consider the fabrick of the Brain, and seriously weigh, that these Ventricles are not formed out of the primary intention of Nature, but result only secondarily and accidentally from the complication of the Brain, he will be far from thinking, that the supreme seat of the Soul is fixed there, where being hem'd in with a most noble Guard of Spirits, it doth execute and perform its Functions. For it neither appears at all out of what matter, and by what artifice the Spirits are there begotten, nor by what ways of emanation they are derived from thence into the other parts of the Brain and nervous System. Wherefore almost all Anatomists, who are of a later Age, have attributed that vile office of a Jakes or sink to this more inward chamber of the Brain. To which Opinion there has been some trust given, for that these Ventricles are often seen in the dead to be filled with water; also from these, ways seem to lye open for excretion, both towards the Tunnel, and also into the Sieve-like Bone. It is observed, that where-ever the blood flows more copiously into any part, and waters it, there Vapors or watry Humors are begotten from the superfluous Serum left in the circulation, which for the most part either exhale out through vaporous Effluvia's, or are brought back into the blood by the Veins or Lymphatick Vessels. But when the blood, by a plentiful influx, waters not only the *Cortex* of the Brain, but the interior marrow also, it remains, that the serous *Latex* (when-ever it abounds more in the blood, than that its superfluities may be reduced immediately by the Veins, or by the Lymphæducts, if they be there, or may be separated by the Glandula's) should slide down into this den, made hollow within the infolding of the Brain. Truly there are many instances, which plainly evince, that the serous humors are ordinarily laid up in the Ventricles of the Brain. Anatomical Observations of men dying of many Cephalick diseases, and especially of soporiferous or sleepy distempers, confirm this. Yea, it may be lawfully thought, that natural sleep follows, for that the Pores and passages of the Brain are occupied and stuffed with a watry *Latex*, which serves for a Vehicle to the Spirits. Then as often as a profound sleep invades any one from a Surfeit, or drinking of Wine, the cause is, that the little spaces in the medullary substance of the Brain, destinated for the motions of the Spirits, are too much obstructed by a Narcotick or a watry humor: certain reliques of which, being resolved into vapor, and thrust out from the company of the Spirits, do often sweat out, or drop into this *Vacuum* or empty space.

After this manner, it may be believed concerning the Ventricles of the Brain, or the empty space left within its plicature or folding together. But in truth, because this matter hath been very much controverted among Physicians of every Age, and the right decision of it seems to be of great moment, for the explicating the offices of the other parts of the Head; I will here compare together the reasons for and against this Opinion, that we may at length give our Judgment of this Opinion, what may be either true, or most likely.

CHAP. XII.

It is inquired into, whether the serous Humors, heaped together within the Vacuity of the Brain, be sent out by the Pituitary Glandula and the Sieve-like Bone, or not?

SInce Experience testifies, that the Serum and excrementitious, I may justly say morbifick, and oftentimes deadly Humors, are found frequently within these Ventricles of the Brain; we ought to inquire more diligently concerning their passage in and out: and the rather, for that it is very much doubted by some concerning the use of these Dens, nor are there wanting those in this late Age, who have endeavoured to bring into vogue the ancient Opinion, though long since exploded, concerning the Spirits being begot in this place, and here exercised. I believe without doubting, for the reasons before alledged, that the Spirits are not here begotten, nor exercised: and no less certain is it made by Experience, that the serous Colluvies is here often gathered together. This therefore only remains, that we should see

from whence, and how this flows hither, and then by what ways of Excretion the ſame ſhould be carried out.

As to the firſt, it is exceeding probable, that the ſerous *Latex*, which is the Vehicle of the Spirits newly produced, and is introduced together with them into the Pores of the Brain, after it is grown ſtale, and being attenuated into Vapour, doth diſtil forth into this Cavern, and there at laſt grows into a watry Humor: for otherwiſe what becomes of that Humor, or into what other Receptacle could it be derived? Beſides this ordinary, and I believe aſſiduous heaping together of the ſerous Colluvies within the Ventricles of the Brain, certainly it may be believed, that this kind of ſerous Humor is diſtilled out of the Glandula's inſerted in the *Chorœidal* infolding, being too much filled, into the Ventricles ſo called. I have often ſeen in a Dropſie the Glandula's of the Brain to be intumified, and like grains of Barley, burſting with too much wet, to become flaccid or withered, ſo that they could not retain the ſeroſities brought to them, but continually diſpoſed them into the Cavity beneath. Truly in a Dropſie of the Brain theſe Cavities or Ventricles are always ſeen to be full of water; the cauſe of which kind of diſtemper is, the blood being made more watry, puts off in its circulation a greater heap of Serum than the Veins can preſently carry back, or the Glandula's are able to receive and retain. For indeed, that the Serum, redounding on every ſide from the Veſſels, may the better ſlide into the Ventricles of the Brain, it is ſo ordered, that the greater infoldings of the Veſſels, with the inſerted Glandula's, ſhould be diſpoſed near all the Ventricles of the Head: becauſe, not only the infolding *Choroeides* is placed nigh the concourſe of the three Ventricles in the Brain, but another infolding, and no leſs noted, (which we above deſcribed) with greater Glandula's, is ſet behind the Cerebel nigh the fourth Ventricle. In all, as it ſeems, for that end ſuch care is taken, that the watry part, coming from the blood, which is deſtinated either for the Brain or the Cerebel, for that it is not fit for the procreating of Spirits, might run into theſe infoldings of the Veſſels. But yet if a greater plenty of Serum be there laid up, than can be contained in them, or may be ſent away outwardly, whatever is ſuperfluous will ſlide into the Cavity underneath.

Hence it appears, from whence, and by what means the ſerous heap is gathered together within the Ventricles of the Brain: certainly to deny this going out is no other than to aſſert every ones Brain big with a Viper, which cannot be brought forth but by gnawing aſunder the bowels of its parent. Who ſhall lightly conſider the parts nigh the Ventricles, and their Fabricks, at firſt ſight only would ſwear with the Ancients, that the excrements of the brain were laid aſide both lower through the Tunnel into the Palate, and above or more forward through the mammillary Proceſſes into the Noſtrils: But if the ſtructure of theſe parts be a little more diligently ſearched into, there is no body who preſently will not eaſily think, that by neither of theſe ways the excretion of any humor can be made; for neither from the pituitary Glandula through the Wedge-like bone, nor from the mammillary Proceſſes through the holes of the Sieve-like bone, is there any manifeſt aperture or opening to be perceived. But in very truth, we do ſuppoſe that the brain is in ſome meaſure purged by both theſe Emunctories, for that objection may be anſwered, That the tranſlations of Humors in living Creatures are eaſily performed through places that ſeem impervious or unpaſſable; for while the Pores and paſſages in all the parts of a living Creature are dilated by ſpirit and heat, they tranſmit the rain of the Serum as through the fine texture of a woolen Cloth. This plainly appears from Arthritick diſtempers, in which the ſerous *Latex* creeps by degrees through the nervous bodies, and paſſing through very ſmall ſpaces, makes a falling down of humors ſometimes upon theſe parts, and ſometimes upon others; ſo that it is obvious, that the Membranes and nervous Proceſſes drink in the ſerous humors like Sponges, and then by a light compreſſion render them by heaps, as is manifeſt in the Tooth-ach; for as often as a Bodkin or Inſtrument is put up into a hollow Tooth, clear water will come out plentifully. Indeed, in the body of a living Creature the paſſages of humors are not only made through open paſſages and chanels; but the thinner and more watry *Latex* creeps through the ſolid and ſmooth bodies of the Nerves, as alſo the Fibres and the Membranes, as through the holes of a Filtre, and ſo is transferred through imperceptible ſtraits from place to place. I ſometime knew in the Impoſtume of the Lungs the humor to have been derived through the Membranes growing to the *Pleura* from the bag into an Iſſue made in the ſide, and ſo the ſpitting ceaſing, the diſeaſe that ſeemed otherwiſe

otherwiſe incurable, was healed by ſuch a way of Evacuation. Why in like manner may we not ſuppoſe the ſerous humors falling down from the Ventricles of the Brain into the pituitary Glandula,and the mammillary Proceſſes to be carried away through the Nerves or Membranes paſſing through here or there?

Concerning the Tunnel, the thing is probable enough; becauſe the poſition and ſtructure of this ſeem to ſhew, that ſome humor is carried out of the Ventricles of the Brain towards the pituitary Glandula. For this part is ſo conſtituted, that a falling down of the humors may be made from every angle and receſs of the interior Brain and its Appendix into its aperture or opening. And as in ſeveral Animals, the figure and ſite of the Ventricles vary very much, (as we have already ſhewn) yet in every one of them all the Ventricles of the Head, whatſoever they be, have their openings gaping towards the Tunnel. But that this Kernel or Glandula, to which the paſſage of the Tunnel is inſerted, receives and carries out the ſerous humors, ſeems alſo to appear from hence; becauſe it admits, not only thoſe falling from the brain into its Pores, but alſo thoſe ſecreted from the blood aſcending into the brain: For that in many four-footed beaſts, certain Veſſels are inſerted to this Glandula from either Carotidick Artery, which intimately enters its ſubſtance: a ſign of which is, that Ink being injected into the Trunk of either Artery, dyes with a black colour the wonderful Net, if it be there, and oftner the interior ſubſtance of this Glandula: whence it may be argued, that the office of this Glandula is to receive the ſuperfluous ſeroſities; and it receives not only thoſe ſent away in the return from the brain, but ſometimes preoccupies or prevents them, and is wont to derive them from the blood before it is carried to the brain. And therefore this Glandula is very ſmall, if the ſuperfluities of the Serum be derived to it only from the brain; but greater, if they come to it alſo from the blood, to wit, as it executes either one or a double office, as we have already ſhewn at large.

But as to what reſpects the way of paſſing through, to wit, by which the humors, depoſited in this Glandula, are carried out, the vulgar Opinion is, that they do come away through the holes of the bone beneath into the Palate: wherefore in thoſe kind of Animals, who have the wonderful Net, and many of its ſhoots enter this Glandula, more holes are made in the underlying bone. Further, if you take away the ditch or gutter of the Wedge-like bone, or the ſeat of this Glandula, cut off from the Skull, and pour water upon its holes being made bare from the Membrane, it paſſing preſently through the ſubſtance of the whole bone, will ſuddenly ſtill forth through other holes lying open in the ſides of the bone. Yet this Experiment concludes nothing for the Opinion propoſed: becauſe theſe holes are wholly wanting in ſome Creatures, and very much in an humane Skull; in thoſe who have them, as in a Calf, eſpecially it is obſerved, that the ſame are filled by ſome hollow Veſſels; into which if a black liquor be caſt by a Syringe, that paſſing through the ſubſtance of the bone, will go into many other Veſſels lying under the bone, and at length into the Trunk of the Jugular Vein; which certainly is a ſign that the humors are not carried from hence into the Palate. But as to the Veſſels which cover over the holes of the bone, and which more abundantly lye under the ſame, they ſeem to be either Veins or Lymphæducts.

But among theſe it is lawful to conjecture, the chief means of Excretion, whereby the ſerous humors, laid up in the pituitary Kernel, may be carried out; to wit, that they are remanded back from it, as from moſt other Glandula's or Kernels, into the maſs of blood. In a Calf the thing lies open to ocular inſpection, nor is it to be doubted of other Animals, who have the admirable Net: becauſe, as the arterious branches, ſo alſo the veinous reach to this Glandula; which ſup up not only the humors depoſited from the Arteries, but alſo thoſe falling from the Ventricles of the Brain. Yea, it may be lawfully believed, that in a Man alſo, a Horſe, and in other Creatures, who want the ſtrange or wonderful Net, there are other Lymphæducts or Water-carriers, or ſome ſuch kind of Veſſels, as are ſeen in the head of a Calf, that moſt certainly carry the humors from this Glandula. We cannot ſo eaſily find out their footſteps, becauſe, before theſe break out of their dens, the tracts of the Lymphæducts, if there be any, would vaniſh. Nor can we find out theſe Veſſels in all, as in a Calf, by injection; becauſe the holes of the bone, by which, as by the leading of a thread, the injection arrives at, and dyes the Veſſels, otherwiſe lying hid, are wanting in moſt. No doubt but time will render ſufficiently manifeſt the reductions of the humors from the pituitary Glandula in other living Creatures: in the

the mean time, it may be lawfully ſuſpected, for that the ſeroſities in ſome are remanded from thence into the bloody maſs, that in all it is done after the like or the ſame manner, although the ways of the paſſing do not yet ſufficiently lye open.

As to the other Emunctory of the Brain, to wit, whereby the ſerous humors, laid aſide from the Ventricles of the Brain into the mammillary Proceſſes, and thence are thought to be ſent away through the holes of the Sieve-like bone: truly, concerning this way of Excretion, it is much more to be doubted, becauſe theſe holes in the defunct being covered over and fully ſtufft, with the inſertions of the *Dura Mater* and nervous Fibres, ſent on either ſide from the mammillary Proceſs, tranſmit nothing of humor, how clear ſoever it be. Further, there is nothing more certain, than that the ſerous humors are preſſed out from the Glandula's and extremities of the Veſſels ending within the Noſtrils into their Caverns; ſo beſides that 'tis ſcarce poſſible for the humors to deſcend thither from the brain, it is not abſolutely needful to ſuppoſe this ſort of means of Excretion. But that we may reaſon a little farther concerning theſe; if it may be lawful to argue from the proviſion, and from the effects of the parts, there is no reaſon but that I may probably believe, that ſome humors alſo do ſhower down from the Brain into the cavities of the Noſtrils: for it being ſuppoſed, that the ſerous humor paſſes through, not only open chanels, but the more ſtrict Pores and paſſages alſo of the Nerves, and creeping both through the Fibres and Membranes, as through the ſtraining or holes of a Filter or Strainer, is carried from place to place, (which it were eaſie to demonſtrate) what ſhould hinder but that the ſame ſort of *Latex* may deſcend through the Fibres impacted in the holes of the ſtraining bone? For although in dead Creatures thoſe parts ſeem to be impervious or unpaſſable, yet during the life of the Animal the paſſages and blind ways of the nervous bodies, being dilated by Spirit and Heat, moſt eaſily tranſmit a copious humor wherewith they are watered.

The Sieve-like Bone in divers Animals is variouſly perforated for the manifold neceſſity and difference of ſmelling. A Proceſs from the *Dura Mater* and manifold nervous Fibres paſs through every one of its holes, and beſmear the inſide of the Noſtrils. But as the impreſſions of ſenſible things, or ſenſible Species, continued as it were by the undulation or waving of the animal Spirits, aſcend through the paſſages of theſe bodies ſtretched out from the Organ towards the Senſory; ſo the humidities watring the ſame bodies, for as much as ſometimes they may be more ſuperfluous than uſual, may diſtil into the Noſtrils through the ſame ways. For indeed ſuch humors as are perpetually to be ſent away from the brain, ought ſo copiouſly to be poured upon the Organs of Smelling, as we ſhall ſhew hereafter, when we ſhall ſpeak particularly of the ſmelling Nerves; in the mean time, that there is ſuch a way of Excretion opening into the Noſtrils, ſome obſervations, taken of ſick people troubled with Cephalick diſeaſes, do further perſwade. I have known ſome very obnoxious to the Scotomy and Vertiginous diſtempers, who had great plenty of clear water that diſtilled forth about the end of the Fit; by which kind of Evacuation, as it were Critical, the Fit was wont to be ended. Not long ſince, a Virgin living in this City, was afflicted a long time with a moſt cruel Head-ach, and in the midſt of her pain much and thin yellow Serum daily flowed out from her Noſtrils: the laſt Winter this Excretion ſtopped for ſome time, and then the ſick party growing worſe in her Head, fell into cruel Convulſions, with a ſtupidity; and within three days dyed Apoplectical. Her Head being opened, that kind of yellow *Latex* overflowed the deeper turnings and windings of the Brain and its interior Cavity or Ventricles. I knew a Gentlewoman that was wont to be infeſted with a moſt cruel Head-ach, alſo with a Vertigo, and a frequent melting of the animal Spirits, or Swooning away; who when ſhe began to be better, after a grievous Fit, felt at firſt a creeping motion in the top of her Brain, as it were the ſliding down of water: then that motion paſſing a little more forwards and downwards, at length many drops of clear water diſtilled from her Noſtrils. This Symptom ſhe uſed to have ſo ordinarily, that the ſick Gentlewoman did not doubt but that this water ſtilled out from the brain it ſelf. I could here bring many other reaſons, which might ſeem to perſwade, that the Ventricles of the Brain, or the Cavity made by the complicature or folding up of its border, is a mere ſink of the excrementitious Humor; and that the humors there congeſted, are purged out by the Noſe and Palate: But it is time for us to haſten to other matters, and to paſs from the Brain, properly ſo called, to its Appendix, *viz.* the oblong Marrow and the Cerebel.

CHAP.

CHAP. XIII.

The Actions and Uses of the oblong Marrow, and of some of its Parts are unfolded.

WE will pass now from the Brain to the explication of its Trunk, to which both it and the Cerebel do grow like Mushrooms or large Excrescences. This part is commonly called the Oblong Marrow; under which name we comprehend all that substance which reaches from the inmost Cavity of the callous Body, and conjuncture in the Basis of the Head, to the hole of the hinder part of the Head; where the same substance, being yet farther continued, ends in the spinal Marrow.

The superficies of the oblong Marrow, though it be made unequal with some protuberances and processes, yet it is not variegated or garnished with any turnings about, and involutions, as it is in the Brain and Cerebel; neither is its exterior and cortical substance, or of an Ash-colour, and the interior, medullar or marrowy and white; but all its frame or substance is in a sort marrowy or medullous: nor does it however appear pure and bright, but much darkened with fibres and hairs variously stretched forth, and diversly going out. To wit, its fibres being figured in various places, after a diverse manner, in some places they are found chamfered, and as it were beamy, in others direct or stretched out at length, and in other places again circular.

The figure of this is forked, and as it were like the Poets *Parnassus*, seems like the ter Y: for its shanks arising more forward from either Hemisphere of the Brain, and inclining one to another, grow together near the centre of the Skull into one and the same Trunk; which notwithstanding, a line being brought through the midst, seems to be made as it were out of two stalks, and those to be distinguished in its whole process.

The oblong Marrow seems to be a broad or high Road, into which the animal Spirits perpetually flow from their double Fountain, to wit, the Brain and the Cerebel, to be derived from thence into all the nervous parts of the whole Body: which Spirits, whilst they are orderly disposed in this common passage, as it were by series and orders, carry a twofold aspect; to wit, they are directed either outward towards the Nerves, when they exert the loco-motive Faculty, or they look inward towards their Fountains, when the acts of sense, or rather the apprehensions of sensible things are performed.

Within this open way, a more large and greatly open path leads straight to the spinal Marrow, through which the Spirits flow forth to the Nerves, the Executors of spontaneous Motion in most members. In the mean time, out of the same tract of the oblong Marrow, lesser paths are carried outwardly, here and there, by particular Nerves, arising from the same, within the Skull. Also besides, many diverting places, *viz.* various processes and protuberances grow to this medullary Trunk, into which, the Spirits destinated to some peculiar offices, go apart: lest that all the Spirits travelling this way and that way in the same path, should meet one another and disturb one anothers offices.

Whilst after this manner, for the performing the acts of Motion and Sense, we suppose the animal Spirits to be expatiated within the oblong Marrow; we affirm, that they are not there begotten, but only exercised. For indeed, they being created only in the Brain and Cerebel, as they proceed from this or that, they perform the offices, either of a merely involuntary Function, or else of a spontaneous, as shall be shewed more largely hereafter.

But that we may unfold here all things which belong to the oblong Marrow, I shall mete it forth from its first coming out to the end of its race, and handle its several *Stadia*, diverting places, and cross ways. Where the callous Body is thought to end, the oblong Marrow begins; to wit, when the medullar substance of the Brain is thickest nigh the bosses or knobs of either Hemisphere, a body of a whitish colour and somewhat darkned or obscured, and streaked like Ivory, is joyned to that marrow on both sides. These two bodies are the extremities or tops of the shanks of the oblong

long Marrow; between which and the Brain there are nigh and very immediate commerces. Either of theſe ſeems as it were a Cylinder rolled about into an Orb, which nevertheleſs conſtitutes the top of either ſhank, not ſpherical, but oval, and ſomething bent downward in the hinder part. A more large portion of its ſuperficies is joyned to the medullar ſubſtance of the Brain; but yet ſome part of it, being free from the coheſion with the Brain, ſhews it ſelf apart, and makes that protuberance ſhewing it ſelf in either lateral Ventricle. Theſe bodies, if they ſhould be diſſected along through the middle, appear marked, with medullar ſtreaks, as it were rays or beams: which ſort of chamferings or ſtreaks have a double aſpect or tendency; to wit, ſome deſcend from the top of this body, as if they were tracts from the Brain into the oblong Marrow; and others aſcend from the lower part, and meet the aforeſaid, as if they were paths of the Spirits from the oblong Marrow into the Brain. And it is worth obſervation, that in the whole Head beſides there is no part found chamfered or ſtreaked after the like manner.

If the uſe of theſe be inquired into, this preſently occurs, that theſe bodies, placed between the Brain and its Appendix, are the great and common diverting places of either; to wit, which receive whatſoever impulſes or forces of the animal Spirits are ſent from either, and communicate them preſently to the other: Or that I may ſpeak more plainly, this part is the common Senſory, to wit, as *Ariſtotle* ſaith, τὸ πρῶτον αἰσθητήριον, the firſt Senſory that receives the ſtrokes of all ſenſible things, dilated from the Nerves of every Organ, and ſo cauſes the perception of every ſenſe; which kind of ſtrokes of ſenſible things, when from hence they are paſſed further into the Brain, preſently Imagination ſucceeds the Senſe: and further, theſe bodies, as they receive the forces of all the Senſes, ſo alſo the firſt inſtincts of ſpontaneous local motions. To wit, as often as the Appetite diſcerns any thing to be done, preſently the reciprocal tendencies of the animal Spirits, that is, from the Brain into theſe parts, are diſpoſed here to act the conceptions of motions coming from any part or member. For here, as in a moſt famous Mart, the animal Spirits, preparing for the performance of the thing willed, are directed into appropriate Nerves. That it is ſo, it appears, becauſe every influence from the Brain into the nervous ſtock, and on the contrary, from this into that, and the mutual commerce of the animal Spirits, muſt of neceſſity paſs through theſe bodies. Wherefore all the Nerves, alſo thoſe which belong to the more inward Organs of the Senſes, ariſe behind theſe chamfered bodies. For the Optick and ſmelling Nerves creep through the ſuperficies of the Brain by a long paſſage and windings about, that they might be inſerted below this part of the oblong Marrow.

For indeed, the Species of ſenſible things, received by thoſe Nerves, might more immediately be carried to the middle of the Brain, unleſs that they ought firſt to be ſtaid at this Senſory. Further, we may lawfully conjecture, that theſe parts perform the aforeſaid office from their chamfered, and as it were beamy contexture: For as thoſe chamferings, with which theſe bodies are marked, (as we but now intimated) are of a double kind, to wit, ſome deſcending, which look from the Brain towards the oblong Marrow; and others aſcending, which are carried diſtinctly from this towards that, it may be lawfully concluded, that in theſe carried upwards, the impreſſions of ſenſible things are perceived: and in thoſe tending downwards are performed the Inſtincts of Motions.

Further, that theſe bodies, as was ſaid, perform the offices of the firſt Senſory, beſides the fabrick of their parts, and the Analogy to be collected thence of their uſe, it ſeems yet more certainly to appear from ſome Obſervations concerning theſe chamfered bodies, after what manner they are affected in Paralytick diſeaſes. For as often as I have opened the bodies of thoſe who dyed of a long Palſie, and moſt grievous reſolution of the Nerves, I always found theſe bodies leſs firm than others in the Brain, diſcoloured like filth or dirt, and many chamferings obliterated. Further, in Whelps newly littered, that want their ſight, and hardly perform the other faculties of motion and ſenſe, theſe ſtreaks or chamferings, being ſcarce wholly formed, appear only rude.

The chamfered Bodies, inclining one to another near their blunt and greater angles, are almoſt contiguous; but that the Trunk of the *Fornix* intervenes with its twofold Root: yet in that place where the two Roots of the *Fornix*, being ſent ſtraight down, are inſerted into the callous Body, a tranſverſe medullar proceſs, like a great Nerve, ſtretched from one chamfered body to the other, as it were joyns the ſame, and

makes

makes them to communicate one with the other. Certainly, this joyning together of the chamfered bodies is made, that their actions and paſſions may not be double: but though the ſpecies of the ſenſible object or conceptions of the motions to be performed, coming from the Brain or Senſory being double, are carried alſo double to the firſt Senſory; yet for as much as either ſubſtance or frame of this, communicates with the other, every impreſſion coming this or that way, becomes ſtill one and the ſame. For it may be obſerved, in the whole Head, that though almoſt all things are double, yet each of them communicate among themſelves, either by a contiguity, or by proceſſes ſent forth. And ſo as by the duplication of it, care is taken againſt the abſolute privation or defect of the act, ſo the joyning together of its duplicature provides againſt the empty or confuſe multiplication of the ſame ſpecies.

After this manner, the chamfered bodies in Man and four-footed Beaſts are conſtantly found of the ſame ſpecies or form, and in every one of them, figured after the ſame manner; and are as it were the Joynts that joyn the Brain to the ſhanks of the oblong Marrow. But we have already ſhewn, that in Fowls and Fiſhes, whoſe brains being alike, differ from thoſe of men and four-footed beaſts, the thing is ſomewhat otherwiſe: For in Fowls the callous body is wanting to the brain; but what ſerves inſtead of it, is found in the oblong Marrow, to wit, two little Ventricles ſhew themſelves nigh the chambers of the Optick Nerves, which are arched or chamber'd with a whitiſh ſubſtance, ſuch as the callous body is in man or four-footed beaſts. Then on the contrary, the chamfered bodies, or the parts which ſerve in their ſtead, in Fowls, are not a portion of the oblong Marrow after the uſual manner, but are entred into the Brain it ſelf. For near the fiſſure of the Brain, two Membranes being marked with medullar chamferings, both diſtinguiſh either Hemiſphere of the Brain, and cover over its Ventricles. The ſtreaks or rays of either Membrane deſcend, and being concentred about the Baſis of the Brain, go together into a medullary proceſs, which is inſerted on both ſides to the oblong Marrow. So theſe parts, *viz.* the callous body, in which the animal Spirits are expanded, and the chamfered bodies, in which their paſſing to and fro is inſtituted, ſeem to be tranſpoſed in the head of Fowls. The reaſon whereof, (as I elſewhere hinted) unleſs I be deceived, is this: becauſe theſe Animals are of leſs excellency in Imagination and Memory than four-footed beaſts; yea alſo, for that the ſenſe and motion of them are their chief Faculties: therefore for the exerciſes of theſe to be performed with a greater expanſion of Spirits, the callous body is transferred into the oblong Marrow, and in its place the chamfered bodies are removed into the Brain.

About the lower end of either chamfered body the ſmelling Nerves are inſerted. For you may take notice, that the mammillary Proceſſes, a little more obſcure in man, but much more conſpicuous in brute Animals, who are endued with a more remarkable ſenſe of ſmelling, do paſs into firm and plainly whitiſh bodies of Nerves, which being dilated or brought nigh the lateral turnings and windings of the Brain, are implanted into the oblong Marrow on either ſide about the lower angle of either Ventricle behind the chamfered bodies; yet ſo, that the Tube or Pipe of either Nerve may open into the Cavity of the Ventricle, as we before ſhewed. After this manner theſe Nerves are carried by a long journey from the fore-part of the Brain, that they may bring the ſenſible ſpecies to the chamfered body, as to the common Senſory, firſt and rather than to the Brain. But we ſhall ſpeak of the ſmelling Nerves more particularly hereafter.

Where theſe chamfered Bodies end from either ſide, a marrowy ſubſtance ſucceeds, which being ſomewhat of a darkiſh colour going forward for ſome ſpace, is diſtinguiſhed by a peculiar bending forward from the other contiguous parts. This *Galen* (perhaps not improperly) calls the Chambers of the Optick Nerves; for in this place the Optick Nerves ſhewing themſelves from the higheſt region of either ſide, being carried downward with a certain compaſs, are united about the Tunnel. Then being divided again, and carried a little further, enter the Skull, going ſtraight forwards to either Senſory. The growing together of theſe Nerves, and their being again ſeparated, ſeems to be ordained for this end, that the viſible ſpecies, received from either Eye, might appear ſtill the ſame, and not double; for this conjunction of the twofold Organ frames the double image into one; which once united, when afterwards it is carried to either ſide of the common Senſory, for that it is on both ſides alike, appears ſtill the ſame. If at any time, through drunkenneſs, or a diſtortion of the Eyes, the object appears double, and two Lights upon a Table, it is becauſe

the image of the ſame thing is received after a different manner by one Eye than the other, for that reaſon the objects are repreſented like two diſtinct things. For that this Eye is diſtorted after one manner, and that after another, the ſame Species, coming to either Pupil by a diverſe angle of incidence, appears diverſe or double. There is another reaſon of the coalition of the Optick Nerves, to wit, that one Eye being hurt, all the viſible animal Spirits might be beſtowed on the other. Further, for that theſe Nerves are carried with a long paſſage, their uniting helps to their mutual ſtrength and ſupport.

Whereas the Optick Nerves ariſe here from the oblong Marrow, all or its moſt intimate ſubſtance is not beſtowed upon them; but theſe Nerves are inſerted into the medullar Trunk, as branches of a Tree to the ſtock, that ſo they may receive by that means the influence of the Spirits, and by this way tranſmit the Species of viſible Things. In the mean time, this more inward ſubſtance of the oblong Marrow is the common paſſage both to the Eyes and to the other nervous Syſtem ariſing more backward: through which, by the going and returning to and fro of the animal Spirits, the impulſes of ſenſible things, and the inſtincts of Motions between the Brain and the other nervous parts, which depend upon it, are performed. Foraſmuch as the ſmelling and ſeeing Nerves ariſe ſo near the chamfered bodies, the reaſon hence is plain, why odors or the objects of the ſenſe of ſmelling ſo ſtrike the Brain it ſelf, and immediately affect it; alſo why there is ſo exceeding ſwift a communication between Sight and Imagination.

Concerning the Optick Nerves in a man, (which alſo in ſome meaſure is after the ſame manner in other living Creatures) we ſhall advertiſe you, that when they, after their uniting or mixing together, being preſently again ſeparated, do go out of the Skull, the ſanguiferous Veſſels going out of the Skull with them, and following either Nerve even to the Baſis of the Eye, are knit into the Trunk of either. There is a noted ſhoot of the Artery deſtinated to this office, carried from the anterior branches of the *Carotides*. Hence, as I ſuppoſe, a reaſon may be given, wherefore, when by drinking or more plentiful eating, a ſleepineſs is cauſed, preſently a great heavineſs, and as it were an oppreſſion, is felt about the Eyes. For when the blood, very much boiling up, fills above meaſure the Veſſels watering the Brain, and by diſtending them, obſtructs the Pores of the Brain, thoſe Nerves alſo from the blood in like manner boiling up within the Optick Veſſels, are preſſed together in their whole paſſage.

In Fowls and Fiſhes this chamber of the Optick Nerves, bunching out with a great bulk, is not much leſs than the Brain it ſelf; for, as we but now intimated, what is inſtead of the callous body is placed here; and in this place the animal Spirits ſeem to have their chief Mart or Empory in a moſt large medullar chamber, or the Sphere of their Expanſion. And ſo, when from hence the animal Spirits are derived from ſo full and plentiful a Store-houſe, it is for that reaſon Fowls are furniſhed with ſo curious an Eye, and with ſo highly perſpicacious and acute a ſight. And the ſame perhaps may hold concerning Fiſhes, if that we conſider the ſight in theſe is performed in a thicker Medium, and often double.

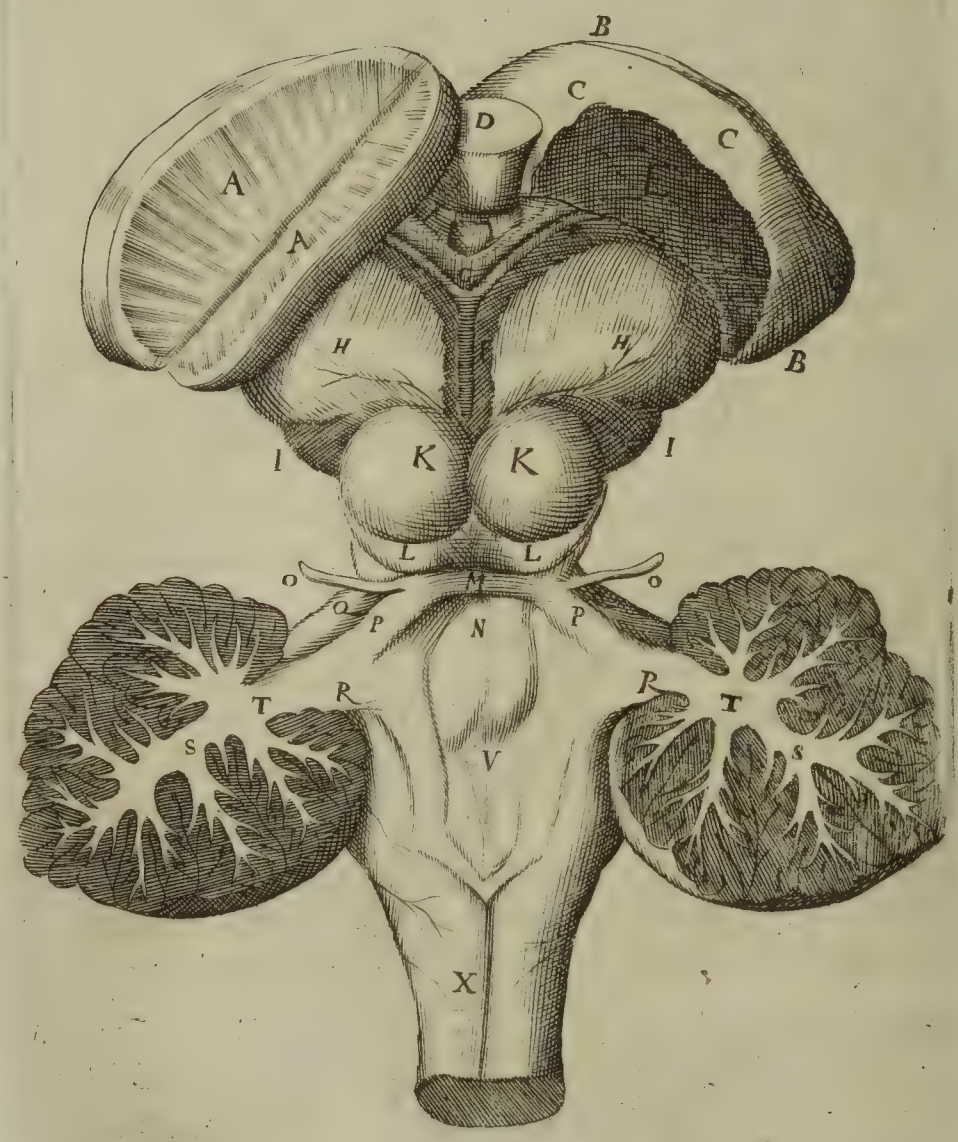
In ſome Animals, in the midſt of theſe chambers of either Optick Nerve, the ſhanks of the oblong Marrow a little opening, leave a chink or aperture, which receiving the ſeroſities coming from every region of the Brain and its Appendix, ſends them through the Tunnel into the pituitary Glandula.

There is no need that we ſhould diſcourſe much here of the Tunnel and the pituitary Glandula, becauſe, already ſpeaking of the Ventricles of the Brain, or the empty ſpace left within its plicature, we fell occaſionally on the conſideration of both theſe; where we ſhewed, that the ſerous humors, which were wont to be heaped together within many places of the Brain and of its Appendix, do all ſlide down on every ſide from each angle and receſs of it into the ſteep opening of the Tunnel; and ſo there is a neceſſity that they ſhould be poured out by it into the pituitary Glandula. Further, it is manifeſt, that this Glandula, in ſome Animals, is charged with a double office; to wit, as it receives the ſeroſities ſent from above from the Brain, ſo alſo it ſeparates the humors from the blood brought to the ſame from the wonderful Net by the Arteries, and prepoſſeſſing them, imbibes them before their ingreſs to the Brain. Wherefore this part is furniſhed with a ſubſtance of a double kind: *viz.* one reddiſh, more thin, and interwoven with Blood-carrying Veſſels, which conſtitutes either ſide of it; and the other more white placed in the middle, to which the Tunnel is inſerted.

But

Fig: VIII ª

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But having ſhewn, that this Glandula receives the humors ſo brought by a double Tribute, we did diligently inquire concerning the ways and means whereby they are at length carried away from thence: and as it appears by an Experiment, that there is a paſſage open from this Glandula into the Veſſels lying underneath the bone, and from thence into the Jugular Veins, we affirmed, that 'twas moſt likely, that the humors to be carried away from this Glandula, (after the manner of others) may be reduced at laſt into the bloody maſs. I ſhall not add any more concerning theſe things, but proceed to the other parts of the oblong Marrow. But that, what hath been ſaid, concerning the ſhanks of the oblong Marrow, and their tops, *viz.* the chamfered bodies, may be the better underſtood, it will ſeem to the purpoſe that we repreſent the Images of all theſe in the following Figure.

The Eighth Figure

REpreſents the oblong Marrow taken out of the Head of a Sheep with the Brain cut off and removed, and with the Cerebel and one ſtreaked Body cut in two in the middle, and other things chiefly belonging to the medullar Trunk.

AA. *The chamfered Body cut in two in the midſt, that its marrowy chamferings may appear.*
B. *The other chamfered Body whole covered with the Choroeidal Infolding with the extreme portion of the callous Body* CC. *ſticking to the ſame.*
CC. *The brim or extremity of the callous Body cleaving to the chamfered Body.*
D. *The Baſis of the* Fornix.
E. *The right wing of the Choroeidal Infolding.*
F. *The paſſage of the Veins being ſtretched out from the fourth Boſom, which being preſently forked, conſtitutes the veinous portion of either wing of the Choroeidal Infolding; under the beginning of this paſſage, very much beſet with Fibres and ſanguiferous Veſſels, the Pineal Glandula lyes hid.*
G. *The hole or chink leading to the Tunnel.*
HH. *The chambers of the Optick Nerves.*
II. *The medullary Proceſſes, or the ways of paſſage which lead from the medullar ſtock into the orbicular Protuberances.*
KK. *The Buttock-form orbicular Protuberances.*
LL. *The leſſer Protuberances called* Teſtes.
M. *The meeting together of the Proceſſes aſcending obliquely from the* Teſtes *into the Cerebel.*
N. *The hole of the lower Ventricle lying under the orbicular Protuberances.*
OO. *The Pathetick Nerves of the Eyes.*
PP. *The medullary Proceſſes ſtretched out from the* Teſtes *into the Cerebel.*
QQ. *Other medullar Proceſſes, which being ſent from the Cerebel towards the oblong Marrow, compaſs about its ſtock, and conſtitute the annular or ringy Protuberance.*
RR. *The loweſt or third Proceſſes of the Cerebel, which being inſerted to the medullar Trunk, become additional cords or ſtrings of it.*
SS. *The medullar Ramifications or Branchings of the Cerebel.*
TT. *The middle marrows of either Cerebel in which its three medullary Proceſſes, conſtituting either little foot of it, grow together.*
V. *The Ditch conſtituting the fourth Ventricle in the medullar Trunk.*
X. *The extremity of the oblong Marrow about to end in the Spinal.*

CHAP. XIV.

Of the Uſes of the Pineal Glandula and the Choroeidal Infolding; alſo of the orbicular Prominences which are commonly called Nates *and* Teſtes; *and other Parts which ſeem to be dependences of them.*

BElow the Chambers of the Optick Nerves in a common Valley which lyes between the tops of theſe and the Buttock-form Prominences, is placed the Pineal Glandula or Kernel in form of a Pine-apple, called alſo *Conarium*; this is not only found in Man and four-footed beaſts, but Fowls and Fiſhes alſo are endued with the ſame. Wherefore, although from hence it may be concluded, that this is of neceſſary uſe; yet we can ſcarce believe this to be the ſeat of the Soul, or its chief Faculties to ariſe from it; becauſe Animals, which ſeem to be almoſt quite deſtitute of Imagination, Memory, and other ſuperior Powers of the Soul, have this Glandula or Kernel large and fair enough.

It is obſerved in all Animals of every kind and form, that to this Glandula, always placed nigh the holes or paſſages, open to the Tunnel, the Choroeidal Infolding is continually joyned; yea this infolding (ſeeming to hang from the Pineal Kernel ſuſtaining its middle Proceſs, as it were by a nail or haſp, from thence) is divided into two wings ſtretching out on either ſide upon the ſhanks of the oblong Marrow, Wherefore we may juſtly ſuſpect, that this Glandula is chiefly made for the ſake of this infolding; and that the office of it is no other than of other Kernels, which are placed nigh the concourſe of the ſanguiferous Veſſels: to wit, that it may receive and retain within it the ſerous humors depoſited from the arterious blood, till the Veins being emptied, may ſup them back, or the Lymphæducts (if there be any there) may convey them outwardly. For it is obſerved, that the Choroeidal infolding is beſet with very many leſſer Glandula's or Kernels, and every where interwoven with them, which imbibe the Serum ſecreted from the blood, in the ſmaller Veſſels; therefore for this very ſame office, where all the Veſſels concur, this Kernel is placed, of a bigger bulk, that it might be able to receive and contain the ſeroſities there plentifully depoſited. Moreover, it is of no ſmall moment, that this Glandula ſuſtains and keeps duly ſtretched out the *Chroeidal* infolding otherwiſe hanging looſe, and apt to fall down into it ſelf, or at leaſt to ſlide out of its proper place. Wherefore I have often taken notice in the Dropſie of the Brain, that this *Glandula* being looſned at the roots by too much moiſture, and often broken off, and removed from its place, the *Choroeidal* infolding hath ſlid together from its proper expanſion, and ſlip'd down lower, and alſo ſuffered its Veſſels to be folded together diſorderly.

From theſe things thus premiſed concerning the pineal Glandula, it will not be difficult to aſſign alſo the uſe of the *Choroeidal* infolding: Concerning which there will be little need to refel that Opinion of the common ſort, which aſſerts, That the animal Spirits, to be beſtowed upon the whole Brain, are begot in this infolding: becauſe the Veſſels of this inſtil nothing to the ſubſtance of the Brain or its Appendix, for that they are no where inſerted to it; but it was before ſhewn, that the Ventricles of the Brain, or the Cavity in which theſe ſame Veſſels are hung, do not at all contain the Spirits; which further appears more plain, becauſe in Cephalick diſeaſes thoſe Ventricles are filled with water, and the continuity of the infolding is diſſolved by too much moiſture, when in the mean time the ſick are indifferently ſtrong in the exerciſe of the animal Faculties.

But indeed we ſuppoſe, that this infolding ſerves for a twofold office: *viz.* Firſt, that the more watry part of the blood, deſtinated for the Brain, might be ſent away into its Veſſels, to the end, that the remaining portion of the bloody *Latex* might become more pure and free from dregs to be diſtilled forth into Spirits; even as is wont to be done in a Chymical Diſtillation, to wit, when there is a peculiar Receiver fitted for the receiving of the Phlegm by it ſelf, more ſincere, pure, and ſubtil Spirits are inſtilled into the other more noted Receiver. The more watry blood entring the arterious Veſſels of this Infolding, being carried from them into the Veins, is remanded back towards the Heart. In the mean time, leſt the Serum, too much redounding,

ing, and boiling up in theſe Veſſels, might hinder circulation, its ſuperfluities are received for ſome time both by the leſſer Glandula's thickly inſerted, and alſo by the pineal Kernel.

The other and no leſs noted uſe of this Infolding, is to conſerve the heat of the blood boiling within the complications of the Veſſels, and as it were circulating about, being excited as from a fire-place within the infolding of the Brain. For though the *Pia Mater* need not implant thick ſhoots of Veſſels in the callous Body and inward Marrows of the Brain, for that they are rather dedicated to the Exerciſe than to the Generation of the animal Spirits; yet that the heat requiſite for the circulation of the Spirits, might be kept conſtantly in that place, this infolding is hung upon the whole neighbourhood. For as the blood, aggeſted or heaped together within the Cavities of the Boſoms, is inſtead of an hot Bath, whereby the animal Spirits are diſtilled plentifully into the outmoſt and cortical part of the brain; ſo the blood contained within the ſmall Veſſels of this infolding, ſeems to be in the place of a leſſer and more temperate Bath, whereby the ſame Spirits might be fitly circulated in the more inward and medullar ſubſtance.

Laſtly, Another reaſon may alſo be given, why the Choroeidal infolding is found always within the Ventricles or Cavity of the Brain, made by its infolding, and after what manner ſoever figured; to wit, that another ſort of commodity might reſult from thence; that when the Veſſels of that Infolding, carrying too watry blood, lay aſide more Serum than the Glandula's are able to receive or contain, what is ſuperfluous might ſlide down opportunely into the underlying Cavity, as into a Sink. Wherefore the *Pineal Glandula*, though ſet in a more eminent place, is however placed always near the hole or paſſage that lyes open towards the Tunnel in every brain.

Next to the Pineal Kernel are found in the upper ſuperficies of the oblong Marrow certain noted Prominences, which are commonly called *Nates* and *Teſtes*. Theſe being placed near together, do conſtitute as it were four Mole-hills, which yet are joyned one to another by certain proceſſes. Beneath theſe Mole-hills, or rather between the joyning of them and the trunk of the oblong Marrow, placed underneath, a narrow and long Cavity or Den is left, which by ſome Anatomiſts is called the fourth Ventricle; but according to others later, who place the fourth Ventricle under the Cerebel, this Cavity is affirmed to be a paſſage to it.

The hinder extremity of this Den ends nigh the beginning of the fourth Ventricle; the more fore-extremity of it opens before the former Mole-hills or little bulkings out, called *Nates*. From the midſt of this Cavity or narrow Den a paſſage goes ſtraight to the Tunnel. It is very much controverted among Anatomiſts concerning the ſite of theſe parts, and of their dependency on one another, and of other parts, and of their uſe: Concerning which this is firſt to be noted, as we hinted above, that theſe four Protuberances are far greater in ſome brute Animals than in a Man, as in a Sheep, Calf, Goat, and the like; alſo in a ſound, dry, and old Head they are more conſpicuous, and their proceſſes, joynings, and habitudes may be more eaſily noted than in a younger, moiſt, or otherwiſe ſickly brain. Indeed the uſe of theſe (unleſs my conjecture deceives me) ſeems far more noble, than that they ſhould deſerve thoſe vile names of *Nates* and *Teſtes*, Buttocks and Teſticles.

Notwithſtanding, to what office theſe parts were deſigned, neither have the ancient Anatomiſts delivered, nor will it, by the help of Reaſon, be eaſie to gueſs for certain. We have already ſhewn, that theſe aforeſaid Prominences ought not to be taken for the two ſhanks either of the Brain or Cerebel bending back one towards another, and ſo growing together into the oblong Marrow. For although from this ſuppoſition a very neat Hypotheſis may be made for the œconomy of the animal Function, to wit, by affirming that theſe double ſhanks, on either ſide, were ſo many diſtinct ways of paſſage through which the animal *Spirits*, for the performing of motions, flowed from the Brain and Cerebel into the oblong Marrow, and returned thence from this into thoſe for the performing the acts of the Senſes: yet from our Method of Diſſecting it plainly appears, that the brain is not fixed to the oblong Marrow nigh this place, but far above it; ſo that indeed the anterior Prominences, unleſs mediately only, *viz.* by the chamfered bodies, receive not any portion of the medullar ſtock, or any influence from the brain, nor can have any dependency from it. Beſides, if the Protuberances called *Nates* were ſhanks of the brain, why ſhould the ſame be in man, (he having got the greateſt brain, the leaſt) or at leaſt leſſer than in

in moſt other living Creatures? Then between the Prominences called *Teſtes* and the Cerebel, although there happens a certain communication; yet it ſeems that there lves open a paſſage from thoſe little lumps into the Cerebel, and not from this, through them into the oblong Marrow. For out of theſe aforeſaid Prominences a medullar Proceſs aſcends obliquely on either ſide into the Cerebel, by whoſe paſſage the animal Spirits, tending from one ſtage to the other, cauſe a mutual commerce between thoſe parts and the Cerebel: But indeed the Proceſſes which lead from the Cerebel into the oblong Marrow, and carry to it its influences, being diſtinct from the former, ſtand ſomewhat lower, as ſhall be more clearly ſhewn hereafter, when we ſhall ſpeak of the Cerebel.

But in the mean time, concerning the offices and uſes to which the aforeſaid Protuberances ſerve, we ſhall make this conjecture. The animal Spirits perpetually flow out and leap back again from the fountain the brain into the oblong marrow, ſo that there may be had a conſtant commerce between the brain and many organs of ſenſe and ſpontaneous motion: from which thoſe parts are entertained which perform their actions, not at the beck of the Appetite, but either by the inſtinct of Nature, or the blind impulſe of the Paſſions; for ſuch receive wholly their influences from the Cerebel, as afterwards ſhall be more fully ſhewed. Whilſt therefore the Spirits, flowing from the brain, abound in the oblong marrow, it is fit that ſome of them ſhould be carried from thence into the Cerebel: (for what uſes this ought to be done, ſhall be told by and by) wherefore from either ſide of the oblong marrow a Protuberance grows forth, into which indeed the Spirits deſigned for the Cerebel, may go apart from the common paſſage of the oblong marrow; and theſe Prominences are the former, which are commonly called *Nates*, and, as we have ſaid, are far greater in moſt brute Animals than in man (the reaſon of which ſhall be declared anon.) The other hinder Protuberances, commonly called *Teſtes*, grow to theſe former, and are only certain Epiphyſes or Excreſcences of them, as it were the heads of the medullary Proceſſes, which are from thence carried by an oblique aſcent into the Cerebel; for when the animal Spirits aſcend from the former Prominences into the Cerebel, they enter theſe latter firſt, as it were the more large beginnings or entrances of their paſſage, from whence they go forward by the paſſage of the medullar Proceſſes into the Cerebel.

Beſides we may take notice, that when the animal Spirits are carried out of the oblong marrow into the greater natiform Prominences to be derived towards the Cerebel, they, according to their cuſtom, (as often as they tend towards the common Senſory from a double Organ of any Faculty) ought to be confounded and mingled together before they enter the Cerebel: wherefore both the firſt Prominences, and alſo the ſecond growing to them are joyned together with certain Proceſſes like wings reaching one another; which connexion indeed of them, becauſe it ought to be diſtinguiſhed every where from the medullar Trunk lying under it hence, from the ſeparation or empty ſpace that comes between the oblong marrow and the growing together of the Prominences, that cavity ariſes, which is by ſome called the fourth Ventricle, and by others the paſſage to it.

If it be yet farther inquired, to what end the animal Spirits are carried by this bypaſſage from the common paſſage of the oblong marrow into the Cerebel, and thence back again; I ſay, that this is done for a twofold reſpect, *viz.* both that the Paſſions or Affections of the ſenſitive Soul, begun from the brain, may be tranſmitted to the *Præcordia* and *Viſcera*; then ſecondly, that the natural Inſtincts, excited in the *Præcordia* and *Viſcera*, might be communicated to the brain. Theſe reciprocal commerces which are had between the brain and the Organs of involuntary Functions, ought to be inſtituted or performed by this private paſſage, leſt otherwiſe the exerciſes of theſe involuntary Faculties ſhould very much diſturb the acts of the outward Senſes, or the intentions of ſpontaneous motions.

As to the firſt, it is obſerved, that by every paſſion of the ſenſitive Soul, as from Anger, Sadneſs, Pleaſure, and other Affections, the *Præcordia* are diſturbed, whether we will or no; which variouſly dilate or conſtrain themſelves, and ſo ſtir up in the blood divers fluctuations. Moreover, from this kind of force of the Paſſions the countenance or the aſpects of the Face are wont to be altered and diſtorted after various ways. The reaſon of all theſe ſeems to be, becauſe when the animal Spirits, exiſting within the brain, are moved according to the Idea of the conceived Paſſion, the other Spirits alſo flowing within theſe diverting places, being in like manner moved,

moved, affect the Cerebel, and that coming between, the original of the Nerves, ſerving to the *Præcordia*, *Viſcera*, and Muſcles of the Face, and ſo the parts to which thoſe Nerves are diſtributed, are alſo ſtirred up or provoked into motions anſwerable to the ſame paſſion.

But the aforeſaid Prominences and their dependences ſerve no leſs alſo for the conveying of the impreſſions of natural Inſtincts to the Brain, that from thence the Appetite and local motions might preſently be retorted: by which all the exigencies or wants perceived by the *Præcordia* or *Viſcera* might be ſupplied. When in a young one newly born the ſtomach crys out for hunger, the Inſtinct of this is carried by the paſſage of the Nerves to the Cerebel, and from thence by the medullar Proceſſes to theſe Protuberances; and the Spirits there inhabiting, form the Idea of the impreſſion, and carry it to the brain, wherein preſently, without any previous knowledge or experience, ſuch kind of conceptions of the Soul are ſtirred up, that every little living Creature preſently ſeeks out the Mothers breaſts and ſucks.

But it may be objected, it does not ſeem of neceſſity we ſhould ſuppoſe theſe kind of acts of the Paſſions and Inſtincts to be made apart in this by-place; for why are not the commerces of the animal Spirits ordained by the influence from the Brain into the Nerves leading to the *Præcordia* and ſo back again through the common paſſage of the oblong Marrow? But to that it may be readily anſwered, That this reciprocal motion of the Spirits ought to be made through the middle region of the Cerebel, from one ſtage to another for the exerciſe of theſe Faculties: And therefore (ſince that all manner of communication between the Brain and Cerebel is performed by theſe Prominences) there ſhould alſo be had a paſſage by the ſame way between this and the Organs of the Functions merely natural. Beſides, if the rage or furious motions of the Paſſions and Inſtincts ſhould be carried in the ſame path in which the forces of ſenſible things are carried, their acts might be greatly confounded by the mutual meeting or gathering together of the animal Spirits. But this kind of Hypotheſis concerning the Acts and Progreſs of the Paſſions and natural Inſtincts, ſhall be made more clear afterwards, when we deſign the Actions and Uſes of the Cerebel, and of the other parts, which in like manner ſeem to be deſtinated to the ſame offices with theſe Protuberances.

In the mean time, what we have affirmed, that the latter Prominences are only Additionals or Excreſcences of the former, will clearly appear to any one beholding them. But this, as we have already hinted, is ſeen without Controverſie in the brains of a Calf, a Sheep, and ſome other four footed beaſts; where, when the *Nates* are ſignally great, the *Teſtes* grow to the ſame in a very ſmall bulk. Further, that the medullary Proceſſes lead from theſe into the Cerebel, and convey the animal Spirits by this by-path, is ſo manifeſt, that none who hath carefully beheld theſe parts, can be able any further to heſitate or be doubtful of it. For indeed the little hairs or fibres wherewith theſe proceſſes, aſcending into the Cerebel, are marked, are otherwiſe figured and placed than thoſe which are beheld in the neighbouring proceſs deſcending from the Cerebel towards the oblong Marrow.

Moreover, either pair of Prominences do not only communicate among themſelves mutually by their ſtretched out wings, but alſo another medullar Proceſs, going croſs-wiſe, knits together the aforeſaid Proceſſes ſtretched out from thence into the Cerebel; and from this joyning together of them two ſmall Nerves are produced, which bending down on either ſide, and being carried forward, enter the *Dura Mater*, and ſo go ſtraight through it, till having reached to the moving Nerves of the Eyes, they go forth of the Skull at the ſame hole with them, going forward ſtraight to the Trochlear Muſcle of the Eye. Concerning theſe little Nerves it is obſerved, that when many others proceed from the ſides or the Baſis of the oblong Marrow, theſe ariſe from the aforeſaid Prominences in the bunching forth at the top. The reaſon of which, if I be not miſtaken, is this: We have affirmed, that theſe Prominences do receive and communicate to the Brain the natural Inſtinct delivered from the Heart and Bowels to the Cerebel; and on the other ſide, or back again, do transfer towards the *Præcordia*, by the mediation of the Cerebel, the forces of the Paſſions or Affections received from the Brain; but in either action the motion of the Eyes is affected with a certain manifeſt Sympathy. For if pain, want, or any other ſignal trouble afflicts the *Viſcera* or the *Præcordia*, a dejected and caſt down aſpect of the Eyes will declare the ſenſe of its trouble: when on the contrary, in Joy, or any pleaſant Affection of the *Præcordia* or *Viſcera*, the Eyes are made lively and

ſparkle

ſparkle again. In like manner, the Eyes do ſo clearly ſhew the Affections of the Mind, as Sadneſs, Anger, Hatred, Love, and other perturbations, that thoſe who are affected, though they ſhould diſſemble, cannot hide the feeling and intimate conceptions of the mind. Without doubt theſe ſo happen, becauſe the animal Spirits, tending this way and that way in this diverting place between the Brain and the *Præcordia*, do at once ſtrike thoſe Nerves as the ſtrings of a Harp. Wherefore from this kind of conjecture which we have made concerning the uſe of theſe Nerves, we have called them Pathetical, although indeed other Nerves alſo may deſerve this name.

There yet remains for us to take notice of the aforeſaid Prominences, that either of theſe pairs, and the Proceſſes hanging on them, are diſtinguiſhed from the trunk of the oblong Marrow lying under by the Cavity between them; ſo that this Cavity or Ventricle ſeems to exiſt only ſecondarily, becauſe the empty ſpace between the aforeſaid bodies, placed above and beneath, ſeparating the ſame one from another, ought to come between. But this Cavity ſeeming to reſult ſo by accident, hath a very ſignal uſe; for in the middle of its paſſage a ſloping aperture reaches towards the Tunnel, through which the humors ſliding into either of its holes, one made more forward, the other more backward, are ſent out. The more forward hole is placed between the chambers of the Optick Nerves, a little before the pineal Glandula, into which the ſerous heap being laid up nigh to the confines of the oblong Marrow, ſlides by degrees: but the other hole is opened more backward into the fourth Ventricle which is planted under the Cerebel; which hole is covered with a thin Membrane, which girding about its mouth and that of the Cerebel, provides leſt the humors, derived from the fourth Ventricle, or the confines of the Cerebel, ſhould fall down any other way than into that hole; but if at any time that little hole be broken aſunder by a deluge of the Serum, the watry Latex ſliding down upon the Baſis of the oblong Marrow, overwhelms the origines of the Nerves, and ſo brings Convulſive diſtempers and meltings, and not ſeldom deadly, of the vital Spirits, as I have obſerved in the bodies of many dying of Cephalick Diſeaſes.

CHAP. XV.

Of the Uſes of the Cerebel, and of ſome of its Parts and Proceſſes.

HAving hitherto continued the former Tract of the oblong Marrow, which as it were the Kings High-way, leads from the Brain, as the Metropolis, into many Provinces of the nervous ſtock, by private receſſes and croſs-ways; it follows now that we view the other City of the animal Kingdom. The ſituation of this being remote enough from the former, its kind of ſtructure is alſo different from it: yea it ſeems that there are granted to this, as to a freeand municipal City, certain Priviledges and a peculiar Juriſdiction.

The Cerebel is placed a little below the orbicular Prominences in the hinder part of the Head; where growing to the trunk of the oblong Marrow by a double little foot, it appears almoſt of a Spherical figure. Its ſuperior gibboſity coheres towards the ſuperficies to the border of the Brain by the intervention of the *Pia Mater*; but nevertheleſs it is intimately united to it, nor is there any immediate commerce between this or that or their parts. There hath been ſpoken enough already of the figure and ſituation of the Cerebel, and of its various Proceſſes, and how it is faſtned to the oblong Marrow; it now remains that we proceed to deſign or draw out the offices and uſes of it, and its ſeveral parts. Where in the firſt place ſhall be inquired into, what kind of office the Cerebel is endued with in the animal œconomy; then when we ſhall deſcend to particulars, there are more things worthy to be noted, which will offer themſelves to our conſideration: *viz.* firſt the infoldings of the Veſſels covering the whole compaſs of the Cerebel, and eſpecially its hinder part, with the heap of Kernels: ſecondly, its folds and lappets ordained with a certain and determinate ſeries, and almoſt after a like manner in all: thirdly, the double ſubſtance of the folds, *viz.* cortical and marrowy: and the concentring of all the medullary tracts in two large Marrows or middeſts: fourthly, either little foot or pedeſtal of the Cerebel made out of thoſe two middle Marrows: and in either pedeſtal three

diſtinct

diſtinct medullar Proceſſes to be found: fifthly, the annular Protuberance made by a proceſs of the Cerebel deſcending into the medullar Trunk: ſixthly, ſome Nerves, which ariſing immediately from this Protuberance and other Nerves in the neighbourhood, which being deſigned for the involuntary Function, receive the influences of the animal Spirits from the Cerebel: Laſtly, the Ventricle or Cavity lying under the Cerebel ought to be conſidered.

1. As to the office or uſe of the Cerebel in general: nothing of it occurs, ſpoken by the Ancients, worthy its fabrick, or agreeable to its ſtructure. Some affirm this to be another Brain, and to perform the ſame actions with it: but if any one ſhould have a ſoft and fooliſh Brain, I greatly doubt, if he ſhould become wiſe, though he ſhould obtain perhaps a more hard and ſolid Cerebel. Others place the Memory in this part, ſuppoſing the Cerebel to be as it were a Cheſt or Box, wherein the Idea's or images of things, before laid up, are kept apart from the incourſe of freſh Species. But it is far more probable, that this faculty reſides in the cortical ſpires of the Brain, as we have elſewhere ſhewn. For as often as we endeavour to remember objects long ſince paſt, we rub the Temples and the fore part of the Head, we erect the Brain, and ſtir up or awaken the Spirits dwelling in that place, as if endeavouring to find out ſomething lurking there; in the mean time, there is perceived nothing of endeavour or ſtriving motion in the hinder part of the Head. Beſides, we have ſhewn, that the Phantaſie and Imagination are performed in the Brain; but the Memory depends ſo upon the Imagination, that it ſeems to be only a reflected or inverſe act of this: wherefore that it ſhould be placed with it in the ſame Cloiſter, to wit, in the Brain, is but neceſſary; for it plainly appears, that there is no immediate commerce between the Brain and the Cerebel.

When ſome time paſt I diligently and ſeriouſly meditated on the office of the Cerebel, and revolved in my mind ſeveral things concerning it, at length, from the Analogy and frequent Ratiocination, this (as I think) true and genuine uſe of it occurred; to wit, that the Cerebel is a peculiar Fountain of animal Spirits deſigned for ſome works, and wholly diſtinct from the Brain. Within the Brain, Imagination, Memory, Diſcourſe, and other more ſuperior Acts of the animal Function are performed; beſides, the animal Spirits flow alſo from it into the nervous ſtock, by which all the ſpontaneous motions, to wit, of which we are knowing and will, are performed. But the office of the Cerebel ſeems to be for the animal Spirits to ſupply ſome Nerves; by which involuntary actions (ſuch as are the beating of the Heart, eaſie Reſpiration, the Concoction of the Aliment, the protruſion of the Chyle, and many others) which are made after a conſtant manner unknown to us, or whether we will or no, are performed. As often as we go about voluntary motion, we ſeem as it were to perceive within us the Spirits reſiding within the fore-part of the Head to be ſtirred up to action, or an influx. But the Spirits inhabiting the Cerebel perform unperceivedly and ſilently their works of Nature without our knowledge or care. Wherefore whilſt the Brain is garniſhed as it were with uncertain Meanders and crankling turnings and windings about, the compaſs of this is furniſhed with folds and lappets diſpoſed in an orderly ſeries; in the ſpaces of which, as in deſigned Orbs and Tracts, the animal Spirits are expanded according to the Rule and Method naturally impreſſed on them. For indeed thoſe in the Cerebel, as it were in a certain artificial Machine or Clock, ſeem orderly diſpoſed after that manner within certain little places and boundaries, that they may flow out orderly of their own accord one ſeries after another without any driver, which may govern or moderate their motions. Wherefore foraſmuch as ſome Nerves perform ſome kind of motions according to the inſtincts and wants of Nature, without conſulting the government of the will or appetite within the Brain, why may it not be imagined, that the influence of the Spirits is derived wholly from the Cerebel for the performing of theſe? For it ſeems inconvenient, that for theſe offices which ſhould be performed without any tumult or perturbation, the Spirits ſhould be called out of the Brain, which are continually driven into fluctuations as it were with the winds of Paſſions and Cogitations.

As I only imagined of the uſe of the Cerebel after this manner, I was led to it at length by a certain thread of Ratiocination; to which afterwards happened an Anatomical inſpection, which plainly confirmed me in this opinion. For in the frequent Diſſection of the Heads of ſeveral ſorts of Animals certain Obſervations did occur, which ſeemed to put this matter out of all doubt. For I firſt obſerved, the pairs of Nerves, which did ſerve to the Functions, wont to be performed by the Inſtinct of Na-

ture, or the force of the Paſſions, rather than by the beck of the will, ſo immediately to depend on the Cerebel, that from thence only the influence of the animal Spirits ſeems to be derived into their origines or beginnings. By what means the Nerves ariſing from the Cerebel, or receiving from it the proviſion of the animal Spirits, do perform only involuntary actions, ſhall be declared hereafter; in the mean time, for the confirmation of this Opinion, we have in readineſs another Reaſon of no leſs moment.

Therefore ſecondly, we took notice, that not only the conformation or make of the Cerebel was ordained after a certain and peculiar manner, that is, that its frame or bulk was couched together with folds or little circles, diſpoſed in a certain diſtinct ſeries, and apt method, and proportionate within themſelves, as hath been ſaid; whence it may be argued, that the Spirits ariſing from hence, and flowing outwardly, are imployed or beſtowed on ſome certain works determinate to one thing. But further it is obſerved, that in all Animals, although they differ in form and kind, yet the figure of the Cerebel is always very like or wholly the ſame. The Brain and oblong Marrow are figured in many after a divers manner; for as we have ſhewed before, there is ſome difference of theſe parts found in man and four-footed beaſts: but between either of theſe, and Fowls and Fiſhes, there is a notable difference as to theſe parts. Notwithſtanding in all theſe the Cerebel, furniſhed wholly with the ſame lappets or little circles alike infolded one in another, is marked with the ſame form and proportion; which certainly is a ſign that the animal Spirits in this work-houſe are begotten and diſpenſed, as it were by a certain dimenſion, for certain neceſſary offices, which are performed in all after the ſame manner; and which cannot be any other than the motions and actions of the *Viſcera* and *Præcordia*. As to the other Faculties, of which ſort are Imagination, Memory, Appetite, yea local motions and ſenſe are exerciſed after one manner in thoſe living Creatures, and after another manner in others; wherefore their brains are formed after a divers manner. But the motions of the Heart and Reſpiration in all endued with an hot blood, are performed after a like manner, that is, with a perpetual viciſſititude of *Syſtoles* and *Diaſtoles*. Beſides, another office is to be aſſigned to the Cerebel, and different from what is convenient or agreeable to the Brain; becauſe where the folds and turnings are wanting in the Brain, they are conſtantly found in the Cerebel. Beſides theſe reaſons drawn from Anatomy, the Pathology of the humane Body affords many others, which confirm the aforeſaid office of the Cerebel. For it oftentimes happens, that cruel and horrid Symptoms infeſt the *Præcordia* and the region of the middle or loweſt Belly; whilſt in the mean time, the morbifick cauſe lyes in the Cerebel or nigh its confines. I have known ſometimes men labouring only in appearance with a Dyſcraſie of the hinder part of the Head, who complained of frequent Swooning and repeated meltings of the Spirits or Deliquiums, as if they were juſt dying: in whom notwithſtanding nothing more could be detected of the morbifick cauſe or its ſeat, but that the Patient perceived a great heavineſs and pain in the hinder part of the Head, and that upon any ſudden motion or bending back of the Head, they were ready to dye. In truth, the Symptoms which are wont to be raiſed up in the diſtemper called the *Incubus* or Night-mare, *viz.* loſs of ſpeech, and a mighty weight or load that ſeems to lye upon the breaſt, proceed altogether from the morbifick matter fixed in the confines of the Cerebel, and obſtructing the paſſages of the Spirits deſtinated for the *Præcordia*. But indeed this Hypotheſis of the office of the Cerebel ſhall be more illuſtrated and confirmed from the uſes of its ſeveral parts, being rightly deſigned or drawn forth.

As to the parts and accidents of the Cerebel, 1. we take notice, that the infoldings of the Veſſels every where cloath the Cerebel no leſs than the Brain, alſo that the ridges and furrows of its folds intimately hide or cover it, which certainly is a ſign that the animal Spirits are begotten in this other work-houſe of them from the watering blood, and inſtilled into its ſubſtance: which thing alſo more clearly appears, becauſe the Arteries and Veins are not only variouſly complicated in the ſuperficies of the Cerebel, but both of them in like manner as in the Brain, ſend forth frequent ſhoots into its more inward ſubſtance; wherefore whilſt the moſt ſubtil and ſpirituous part of the blood being carried through long windings about, and as it were ſerpentine chanels of the Veſſels, and ſo ſublimed into Spirits is received within; the bloody part is carried away by the ſhoots of the Veins ſent alſo deeply down. Further, even as the more watry portion of the blood, deſtinated for the Brain, runs into

into the *Choroeidal* infolding; (whereby it may there lay aſide its unprofitable Phlegm into the Glandula's) ſo for the ſake of ſeparating the Phlegm an heap of Glandula's, with the foldings of the Veſſels, as it were a Receptacle fitted for this buſineſs, is placed in the hinder region of the Cerebel.

2. From the blood, after this manner cleared from Phlegm, and made ſubtil by a long circulation, a very pure and ſpirituous liquor is inſtilled into the cortical ſubſtance of the Cerebel, which is preſently exalted by the Ferment there placed into animal Spirits. For indeed we have affirmed, that the Spirits are procreated only in the cortical part of the Cerebel, as in that of the Brain: wherefore, becauſe this kind of Cortex is wanting to the oblong and ſpinal Marrow, we think theſe parts do ſerve only for the exerciſe of the animal Spirits, and not for their production.

3. The Spirits every where produced within the cortical or exterior compaſs of the Cerebel, in which they are preſently prepared for the work of the animal Function, are derived from all the folds into the medullar tract, and thence into two ample middle Marrows; where they keep full as it were the fountain or ſpring, and there like the bubling up of waters, are circulated within with a perpetual turning, and from thence they continually ſtream forth into the parts of the nervous Syſtem proper to themſelves.

4. As to the ways of Emanation it is obſerved, that the two middle Marrows of the Cerebel paſs as it were into two pedeſtals or little feet, by which they are faſtned to the trunk of the oblong Marrow; and for that in either little foot of it three diſtinct medullar Proceſſes are found, all theſe, or at leaſt two of them, are as it were ſo many paths whereby the animal Spirits ſtream forth from their fountain and flow back again.

5. The firſt of theſe Proceſſes aſcends into the Cerebel from the orbicular Prominences: the uſe of this we have already declared; to wit, that there may be a certain paſſage between theſe Prominences and the Cerebel, in which, whilſt the animal Spirits, as in a by-path, move this way and that way, to and fro, they may tranſmit both the force of the Paſſions from the Brain by the interpoſition of the Cerebel to the *Præcordia*, and convey alſo the natural Inſtincts delivered to the Cerebel from the *Præcordia* and *Viſcera* towards the Brain. But the ſecond Proceſs deſcending ſtraight from the Cerebel, embraces the medullar Trunk, and ſo going round about it, conſtitutes the annular or ringy Protuberance, out of which the fifth, ſixth, and ſeventh pair of Nerves take their originals; ſo indeed, that this Protuberance ſeems to be the Ware-houſe or Store-houſe of the Spirits flowing from the Cerebel, from which they may influence and be derived into the oppoſite paſſages of the Nerves. Laſtly, the third proceſs of either little foot, deſcending from the Cerebel into the oblong Marrow, is inſerted into its trunk over againſt where the eighth pair of Nerves have their original; ſo that it ſhould ſeem very likely, the proviſion of the Spirits deſtinated for this Nerve is derived alſo by this way from the Cerebel; then what Spirits ſuperabound, remaining longer than this Nerve requires, they ſliding down into the common belly or chanel of the oblong and ſpinal Marrow, increaſe the plenty of thoſe parts. For this ſame end the ſmooth and pyramidal bodies are reached out of the annular Protuberance above the oblong Marrow towards the Spine, to wit, that by the paſſage of thoſe Proceſſes the Spirits of that proviſion or ſtock ſuperabounding, might flow out partly into the beginning of the eighth pair, and partly into the common tract of the medullar Trunk.

Thus much we have ſpoken briefly and ſummarily of the Uſes of the Cerebel, and of its parts and Proceſſes. But that it may be the better underſtood, and alſo that this new thought of Theory concerning the involuntary Function of the animal Regiment, may be more clearly illuſtrated, we ſhall here give you a more particular Order or Method of the Spirits brought forth in the Cerebel, and as it were take a view of, or muſter their Arms or Forces. Further, it will ſeem to the purpoſe, that we ſhould deſign or draw forth more openly the abundance or plenty of the Nerves receiving their gifts from this Fountain of the Spirits concerning the Acts to be performed only of the involuntary Function.

CHAP. XVI.

Of the various Order and diverſe manner of Exerciſe of the Spirits produced in the Cerebel for the Acts of the involuntary Function.

AFter having ſhewn, that the office of the Cerebel is to procreate animal Spirits apart from the Spirits begotten in the Brain, and to diſpenſe them into the Nerves, the Executors of the involuntary Actions and Paſſions; there yet remains to be unfolded by what manner of œconomy or government the Spirits inhabiting the Cerebel and made free, are buſied both by an inteſtine Circulation, within their proper dwelling places, and alſo are wont to be expanded and flow out with an exterior irradiation for the neceſſities and wants of other parts: then theſe things being ſhewn, we ſhall deſign more particularly the Uſes and Offices of the Nerves, and of ſome other Proceſſes doing ſervice to this Government.

As to the firſt, as the Cerebel is the other primary Root of the ſenſitive Soul, or the Fountain from whence the animal Spirits, being diffuſed through the whole ſubſtance of it and its Appendix, are continued ſtill under the ſame Syſtaſis and radiant Contexture, it is to be noted, that this radiation of the Spirits from the Cerebel doth flow after another manner than the other from the Brain: becauſe this being left to it ſelf, is beſtowed by a conſtant efflux or flowing out on the Organs both of the vital Function and the merely natural, and its expences by an equal continual proviſion of Spirits, are made up again from the bloody maſs continually inſtilled in. But on the contrary, the Spirits flow out from the Brain, neither by ſuch a continual courſe without intermiſſion and by little and little, nor are ſuſtained by a perpetual proviſion and ſliding in by degrees; but both the loſs of them, and their refection, are uncertain, unequal, and variouſly interrupted. For neither are the ſpontaneous Acts of the Function it ſelf, to which they ſerve, performed after any conſtant or always the ſame manner; but according to exterior accidents and occaſions we put them forth by heaps, and with a certain force ſometimes, and again ſometimes we ſuffer them to be wholly intermitted and unimployed. Therefore the Spirits alſo are in like manner ſupplied with an uncertain meaſure; to wit, they are inſtilled in ſleep plentifully and more copiouſly, but waking more ſparingly and with hard labour, or ſcarce not at all. Yea the involuntary portion it ſelf of the ſenſitive Soul (which flows from the Cerebel) for that it hath a near commerce and affinity (as was already ſaid) with the other radicated in the Brain, therefore it is wont to be much diſturbed in the performing its office equally and peaceably, and being variouſly affected and agitated by the impulſes ſent here and there, or from this place and that, it is compelled, ſometimes to contract, ſometimes to extend its *Syſtaſis* in the whole or in part, and ſo is rendred obnoxious to ſeveral Paſſions, and ordinarily inſtigated to the performing irregular, and diſorderly actions.

But indeed the contexture of the Spirits, or the part of the Soul irradiating the Cerebel and its Appendix, is both affected with a certain ſenſe, and is urged into motions appropriate to it ſelf, though divers. The ſenſe or Sympathy belonging to this, if it be terminated within the confines of the Cerebel, is always private, nor goes any farther forward to the Brain with a more ſtrong undulation or wavering; and becauſe it is performed the living Creature knowing nothing of it, unleſs by the effect it cannot be known, for that it excites a peculiar motion. But ſuch an affection of the Cerebel is implanted in it, that by every new diſpoſition of the *Præcordia* and *Viſcera* communicated to this from beneath, alſo from every violent paſſion excited within the *Forum* of the Brain, and ſo ſent from above, a certain impreſſion is carried to the inhabitants of the Cerebel: by which indeed they are diſpoſed into various ordinations for the performing theſe or thoſe motions reſpectively.

For examples ſake, ſo long as the tranquil region of the Cerebel, like a ſerene and fair Heaven, is free from all perturbation, the Spirits its inhabitants, being poured out with a pleaſing ſenſe, or as it were a certain complacency, flow within their proper habitations, both with a gentle circulation, and alſo with an equal flowing out enter the beginnings of the Nerves ſerving to the Functions both vital and natural: by which indeed eaſie Reſpiration, the Pulſe, Chylification, and other offices of the ſame

ſame nature, are performed peaceably. But if that any trouble or moleſtation happen outwardly to any one, from whence an impreſſion of it is communicated to the Cerebel, preſently a troubleſom ſenſe being ſtirred up there, it diſturbs the animal Spirits in the Fountain it ſelf, and ſo is wont to excite irregular motions in the Organs of the involuntary Function. For from hence the frequent alteration of the Pulſe and of Reſpiration, alſo Cramps of the *Viſcera*, and convulſive motions ariſe unknown to us, or alſo againſt our wills. But an impreſſion ſent from elſewhere to the Cerebel, and inducing the ſame kind of troubleſom ſenſe, either aſcends by the paſſage of the Nerves from the *Præcordia* and *Viſcera*, or it is carried from above from the Brain by the paſſage of the orbicular Prominences; as ſhall be ſhewn more largely anon.

In the mean time, from theſe things already ſhewed of the paſſive power or ſenſe of the Cerebel, it may be eaſily collected, by what means, with what order and ſeries the animal Spirits, ariſing from the ſame, are moved. But firſt you muſt diſtinguiſh between their twofold motion. For one is cuſtomary and ordinary, conſiſting in a perpetual and equal efflux of Spirits; by which indeed, they flowing into the beginnings of the Nerves nigh their riſings, eſpecially of the intercoſtal and wandring pair, the ſolemn acts of the Pulſe, Reſpiration, Chylification, and others of the involuntary Function are performed. Then ſecondly, the other motion happens extraordinary and occaſional, which the ſame Spirits perform confuſedly, as it were in diſturbed orders: as when the Pulſe becomes quicker or ſlower than it ought, or the Reſpiration unequal or interrupted; and when the other Faculties, which belong to this Claſs, are perverted from their regular and conſtant manner. But theſe kind of extraordinary motions are again twofold, to wit, for that its inſtigation proceeds from a double bound; for the impulſe whereby the Spirits inhabiting the Cerebel, are compelled into an irregular action, (as we have but now intimated) is carried either from beneath, *viz.* from the *Præcordia* and *Viſcera*; or it is wont to be tranſmitted from above, to wit, from the Brain.

As to the firſt, if at any time the *Præcordia* grow too hot, and are burnt with a feaveriſh heat, preſently by the paſſage of the Intercoſtals and the wandring pair of Nerves, the Spirits reſiding in the Cerebel, being warned of this evil, inſtitute more frequent and ſtronger acts both of the Pulſe and of Reſpiration. In like manner, if by chance the humors and ſharp Juyces irritate or greatly trouble or afflict the Coats of the Ventricles or Inteſtines through the ſenſe of this affection communicated to the Cerebel, the inſtinct of performing the motion is reciprocated, whereby the fibres of the parts, being contracted and wrinkled together, endeavour the ſhaking off of the hurtful matter. More inſtances might be here brought of all the other acts of the vital or merely natural Function: of which beſides it may be obſerved, that when a ſenſe of the trouble is immediately conveyed from the *Præcordia* or *Viſcera* to the Cerebel, this affection, like the waving of waters, is either ſtopt or terminated there, from whence a motion, as the buſineſs requires, unknown to the Brain, is preſently retorted, as when the actions of the *Præcordia* are altered by a feaveriſh diſtemper without our knowledge; or ſecondly, that ſenſe of the trouble being tranſmitted to the Cerebel, for that it is more vehement, it unfolds it ſelf more largely, and like a ſtronger waving of waters, paſſing through the Cerebel, goes forward further even to the Brain, and warns its inhabitants of the evil; by which they being incited to oppoſe the enemy, cauſe a motion of another kind: So (as hath been ſaid) when the *Præcordia* grow cruelly hot, the Cerebel feeling this, makes the Pulſe and Reſpiration ſtronger. But further, the Brain being warned of the ſame trouble, ſeeks and diligently requires cold drink and other remedies to moderate the heat. Moreover, it is after this manner alſo in ſeveral other actions, which though they are regular, yet being made in the Brain without any previous knowledge, they are ſaid to be done by Inſtincts merely natural; as when brute Animals, being newly brought forth, preſently ſeek for the Dams teats, and greedily ſuck; or Birds, without any ſhewing or example, build neſts with wonderful Art, lay eggs, and hatch young ones. In theſe kind of works the Brain being taught before by none, directs fit means to the ends inſtituted by Nature: which indeed ſeems to be done by this means. The ſenſe of every neceſſity being brought to the Cerebel, incites the Spirits inhabiting it to ſuccour it; which when they are not able to do, the impreſſion going from thence further forward, is carried to the orbicular Prominences: by which the Spirits there inhabiting, being preſently ſtruck, form the Appetite or the intention of performing, which

which being thence communicated to the Brain, it readily cauſes that local motions, fit for the executing of the work, be retorted. Of theſe we ſhall ſpeak anon a little more largely, when we treat of the reſpect which happens between the orbicular Prominences and the annular Protuberance.

In the mean time, we ſhall take notice in the ſecond place, that the irregular motions of the Spirits inhabiting the Cerebel, are wont alſo, by reaſon of the force of the affections, to be tranſmitted from thence to the Brain: for as often as a violent paſſion, as Joy, Sadneſs, Anger, Fear, or of any other kind, is conceived in the Brain, preſently the impreſſion of the ſame being brought through the by-paths of the Prominences into the Cerebel, diſturbs the Spirits deſtinated to the vital or merely natural Function in their very fountain, and for that reaſon preſently induces notable mutations in the Organs of thoſe Functions.

What hath been ſpoken hitherto of the Cerebel being imployed about the offices of the involuntary Function only, alſo concerning the ſenſe and the motions both uſual and irregular of the Spirits inhabiting it, will be made more clear, if laſtly we ſhall ſhew the offices of the Nerves and of the other proceſſes, immediately depending upon the Cerebel, to be no other than ſuch as perform only involuntary Acts: which ſhall be briefly and ſuccinctly done, as far as is pertinent to our purpoſe, becauſe a more full conſideration of them is left to another place.

CHAP. XVII.

Of the Nerves, which receiving the ſtores or companies of the Spirits from the Cerebel, beſtow them on the Acts of the involuntary Function.

WE have already ſhewed, that out of the annular Protuberance (which is a certain Proceſs of the Cerebel) three pairs of Nerves, to wit, the fifth, ſixth, and ſeventh immediately ariſe. We have ſaid that Protuberance to be as it were a Repoſitory or Store-houſe, wherein the Spirits flowing out of the Cerebel, and to be derived into the depending Nerves, as occaſion ſerves, are kept: and in the mean time, whilſt they remain there, they who ſtream out from either middle Marrow of the Cerebel diviſively, meeting mutually in this Cirque, are united together. But as the aforeſaid three pairs of Nerves receive the forces of the Spirits from the Cerebel by the mediation of that Protuberance; ſo alſo the eighth pair having its riſe near the inſertion of the other (*viz.* the loweſt) medullar Proceſs ſent down from the Brain, ſeems to derive by its paſſage the influence of the Spirits no leſs from the Cerebel: wherefore when theſe four conjugations of Nerves owe the Tribute of their Spirits wholly to the Cerebel, if I ſhall ſhew that all theſe Nerves ſerve chiefly and almoſt only to the involuntary acts of the Senſes and Motions, ſurely this will be a ſignal Argument, that according to our Hypotheſis, the office of the Cerebel is to beget and to diſpenſe the animal Spirits requiſite for the involuntary Functions.

Therefore in the firſt place we obſerve of the fifth and ſixth conjugation of Nerves, that as this ariſes out of the Baſis of the greater Ring, and that from its ſides both in man and in four-footed beaſts; the fifth pair being carried more forward, diſtributes its branches into the Glandula's of the Eyes, into the Noſtrils, into the Palate, Teeth, yea and into moſt parts of the Face and Mouth; but the ſixth pair is wholly beſtowed on ſome Muſcles of the Eyes. Further, out of the trunk of the fifth pair two ſhoots, and another out of the Nerve of the ſixth pair bending back behind, meet together; and what is wonderful, and not before taken notice of by Anatomiſts, the intercoſtal Nerves, deſtinated to the *Præcordia* and *Viſcera*, do make a Trunk; ſo that the Nerves of the fifth and ſixth pair ſtretch out a double Ramification, to wit, one more above about the parts of the Mouth and Face, and the other lower through the *Viſcera* of the middle and loweſt Belly. But it will appear clearly to any one conſidering this thing more carefully, that the chief branches of either partition are imployed about the involuntary offices of Motion and Senſe, of which ſort thoſe are chiefly, that either cauſe the paſſions, or perform the natural Inſtincts.

1. Concerning the intercoſtal Nerve, which (as was ſaid) being radicated in the Nerves

Nerves of the fifth and ſixth pair, depends as to its origine wholly on the Cerebel, it is not here to be doubted but that it looking towards the *Præcordia* and *Viſcera* in a man, and towards theſe latter only in moſt four-footed beaſts, is beſtowed on the Functions only vital and merely natural, and ſo confers little or nothing to ſponta-neous actions. Further, foraſmuch as this Nerve reaching forth into the *Præcordia* and *Viſcera* of the whole Abdomen, is continued by its ſuperior ramification alſo into the Eyes, as alſo into the parts of the Mouth and Face; certainly from hence a true and genuine reaſon may be given wherefore in every paſſion the Eyes, Face, and Mouth do ſo correſpond with the affections of the *Præcordia*, often unknown to us or againſt our minds, that oftentimes we are compelled to betray the moſt intimate ſenſe of the Heart by the countenance and aſpect. Yea, hence a reaſon may be brought, why in ſneeſing, yawning, laughing, and crying the Muſcles of the Face conſpire ſo in motion with the *Præcordia*. Beſides, when in man different from any other living Creatures beſides, as we ſhall ſhew afterwards, many ſhoots are ſent from the intercoſtal Nerve to the Nerve of the Diaphragma; this certainly is the cauſe why riſibility is the proper affection of man.

But the Trunk of the fifth pair being carried more forward, and diſtributing its branchings through the parts of the whole Face, cauſes the ſame not only to be pathetically moved, and figured according to the affections of the *Præcordia*; but alſo produces ſome acts, both of motion and ſenſation, of another kind, which for the moſt part are involuntary, and ſo ſeem to depend wholly upon the Cerebel im-mediately. For example, this Nerve imparts ſhoots to either mandible requiſite for the buſineſs of chewing: but it is very well known, that the taking in of the food at the mouth is the firſt and oldeſt buſineſs of every Animal, which indeed is taught by natural Inſtinct before any knowledge of the Brain. But as to the Senſes, the bran-ches of this pair conduce ſomething to the ſmelling, but for the moſt part for the knowing and chuſing of ſavors. Hence it comes to paſs, that as odors refreſh the Brain by the ſmelling Nerves, ſo alſo they affect the Cerebel by the branch of this pair, and are wont by that means to recreate the *Viſcera* and *Præcordia*. But ſapors or taſtes (for that they are almoſt the peculiar Province of this) carry whatſoever they have of pleaſantneſs or trouble, firſt to the Spirits inhabiting the Cerebel, and then by their conſent to the *Præcordia* and *Viſcera*. Hence it is, that a Pectoral not only allays hunger, but the very firſt taſting of Wine raiſes up thoſe that are fainting or ſwooning away. Moreover, foraſmuch as from this Nerve certain branches ſerve for the taſte, and others for the ſmell, there is contracted ſo ſtrict an affinity between either of theſe Senſories, that nothing pleaſes the taſte unleſs it be approved of by the ſmell: and the loſs of one of theſe ſenſes oftentimes cauſes the privation or the dimi-nution of the other.

2. Concerning the Nerve of the ſixth conjugation we obſerve, that as one ſhoot is bent back for a root of the intercoſtal Nerve, the remaining Trunk of it being car-ried forward towards the ball of the Eye, is diſtributed to two of its Muſcles, *viz.* to the ſeventh, proper to beaſts, and to the drawing Muſcle. Hence may be infer-red, that this Nerve, beſides the influence of it beſtowed on the vital and natural Function, ſerves alſo for the producing ſome pathetick motions of the Eye, to wit, ſuch as are wont to obey the affections of the *Præcordia* and *Viſcera*; ſo that the whole proviſion of the animal Spirit, which it receives from the Cerebel, it beſtows only on involuntary acts.

3. The ſeventh pair, or the hearing Nerves, ſeem alſo to depend upon the Cere-bel, foraſmuch as they take their originals out of the annular Protuberance: but the uſe of them is a little otherwiſe in man than in four-footed beaſts. For in him the annular Protuberance is one, and that very big, from whoſe lower margin the audi-tory Nerves proceed: but in Brutes the Protuberance is twofold, *viz.* one greater, ſent down from the Cerebel, in which the beginnings of the fifth and ſixth pair of Nerves conſiſt; then near this there is another leſſer, and as it were ſecondary, from which the auditory Nerves proceed. This leſſer and lower Ring doth not ſo mani-feſtly depend on the Cerebel, as the former; but there is ſtretched out from either height of it a white medullar line upon the oblong Marrow in the bottom of the fourth Ventricle: ſo as this ſeems to receive either the Spirits from the oblong Mar-row, or at leaſt to carry into the ſame the ſenſible Species: for what uſe it is ſo con-ſtituted ſhall be inquired into afterwards; for concerning theſe Nerves of the ſeventh pair, foraſmuch as ſome offices of them very much illuſtrate the government or œco-

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nomy of the Cerebel, we ſhall diſcourſe here a little more largely.

Therefore in man, who hath got a great and undivided annular Protuberance, the auditory Nerves coming out of its margin or brim, ſhew its ſtock received of the Cerebel: by which means we may ſee the tasks of thoſe Nerves quadrate with the aſſigned government of this. We have ſhewn before the Proceſſes (which in a manner may be called diſtinct Nerves) of the ſeventh pair to be twofold on either ſide: one, the ſofter of theſe, ſerves only for the ſenſe, but the other harder ſeems to perform ſome motions. This latter Nerve, being carried without the Skull, is divided into three branches, all which ſerve to pathetick motions, or at leaſt to ſuch as are performed without conſulting the Brain.

1. The firſt of them being bent back towards the auditory paſſage, is beſtowed on the Muſcles of the Ear. Without doubt, by the action of this, it is effected, that all Animals at the ſudden impulſe of a ſound or noiſe, erect their Ears at it were to catch the ſound too ſoon paſſing by. 2. The other branch of this ſame Nerve climbing over the Muſcles of the Jaw, ſends forth ſhoots towards either corner of the Eye: which are inſerted into the Muſcles lifting up the Eye-lids; the office of which is certainly to open ſuddenly the Eyes at the ſudden approach of any ſound, and as it were to call them forth to watch, that by the ſtroke of the Air being brought to the Ear, the Eye might preſently look about to ſee what is the matter, and whether there might be any danger near or not: which alſo all Creatures do unthought of. 3. The third branch of the ſame auditory Nerve deſcending towards the root of the Tongue, is diſtributed to its Muſcles, and to thoſe of the Bone *Hyoides*, and ſo actuates ſome of the Organs for the framing the Voice. For this reaſon in ſome meaſure it comes to paſs, that living Creatures being aſtoniſhed at an unaccuſtomed or horrid ſound, preſently putting forth an uncertain voice, cry out and make a noiſe. But the conformation of theſe kind of Nerves in man ſerves for another more noted uſe, to wit, that the voice might fitly anſwer to the hearing, and that this might be ſet as the Echo of the ſound admitted by this: ſo indeed, as on the other ſide, there be two Nerves of the ſame pair, the ſound is received by the hearing through one, which is rendred again by the voice through the other. The common and extrinſick Echo conſiſts in this, that a certain undulation or waving of the Air ſhaken or moved, being ſtirred up, and tending towards or about, when by reaſon of ſome ſtop or hinderance, it cannot go any further directly, being preſently repercuſſed or ſtruck back or reflected at certain angles, it is terminated contrary to the former bound. In like manner, in the hearing, the impreſſion of the ſound, or the Species admitted to the Ears by the hearing faculty of the Proceſſes of the ſame or neighbouring Nerve, and being carried inwardly towards the Cerebel and common Senſory, and from thence again reflected on the vocal proceſs, it is carried out by the Mouth. But between theſe there is ſome difference, to wit, foraſmuch as the outward Echo renders back the ſound immediately; but the ſound of the Hearing is not neceſſarily carried forth at the mouth preſently, but that this leaves an Idea in the Head, according to which afterwards, as occaſion ſerves, the voice is formed, which bears the type and image of that, though ſome time before admitted.

But here (if I may digreſs a little) we ſhould inquire in what part of the Head the Ideas of ſounds are left: whether only in the Brain, which is the Cheſt of Memory acquired as it were artificial; or whether not alſo in the Cerebel, which is the place of natural memory? Truly we ſuppoſe, that ſounds belong to both theſe, as it were to diſtinct Store-houſes. Every audible impulſe being ſtruck againſt the Ear, it is preſently carried by the paſſage of the auditory Proceſs to the annulary Protuberance; but from thence it is carried, as other ſenſible Species, to the chamfered bodies or the common Senſory; (which way it paſſes thither, ſhall be ſhewed afterwards) this impreſſion tending from thence farther, and being alſo delivered to the Brain, ſtirs up the Imagination, and ſo leaves in its Cortex an image or private mark of it ſelf for the Memory. Further alſo, as the auditory Proceſs depends on the Cerebel, and receives from it the proviſion of the animal Spirits: ſo it is moſt likely, that by the receſs of the ſame Spirits the Ideas of the Sounds are conveyed alſo to the Cerebel; which forming there footſteps or tracts, impreſs a remembrance of themſelves, from whence when afterwards the Species there laid up are drawn forth by the help of the vocal proceſs, voices, like the ſounds before admitted, and breaking forth in a certain ordained ſeries, come to be made.

Hence it is uſual, that muſick or melody is ſoon learnt by ſome men, which afterwards

wards they bring forth with exact Symphony, without any meditation or labour of the Brain; to wit, from the distinct accents of the heard harmony, the Spirits moving within the Cerebel are disposed into peculiar Schemes; according to which, when they flow on both sides into the vocal process of the auditory Nerve, they render as it were with a certain spontaneous voice, and like a Machine or Clock with the succession of Species, the measures or Tunes of the Instrument which they had drunk in at the ears. Without doubt hence the reason may be sought, why some men learn Musick without any trouble, and others hardly or not at all. For it is observed, that some Children, before they can speak distinctly, quickly sing, and remember certain Tunes; whilst others, though very ingenious men and of excellent memory, are very Fools at Musick, and become uncapable, as an Ass for the Harp; wherefore 'tis commonly said, that some have musical ears, and others are wholly destitute of that faculty. In the mean time, 'tis to be confessed, that in these the Organs of the Voice are not defective; but all the fault, though wrongfully, is cast on the hearing.

But in truth the genuine cause of this defect seems to consist in this, that when in all, the audible Species go to the Cerebel sooner and more immediately than the Brain; yet in some the Cerebel being harder, and not easily yielding to the received impressions, those Species, because they could impress nothing of themselves in their passing to the Cerebel, being carried towards the common Sensory, leave their Types or Ideas chiefly and almost wholly in the Brain: which part being still busied with disturbed motions, is less apt to keep distinctly the compositures of Harmony. But in the mean time, in others the Species of audible things, besides that they are carried to the common Sensory and to the Brain, do also affect the Cerebel, especially if they are harmonically figured (forasmuch as in them there is a softer capacity of the impressions) with a peculiar order and Scheme of the animal Spirits: where, as the Species of the Harmony being disposed in convenient little places and cells are kept, afterwards they flow out from thence, almost unthought of, without any endeavour or labour of remembrance, but in a distinct series, and as it were in composed modes and figures, and so by blowing up the vocal processes, they constitute sweet Tunes and vocal Musick.

If that the divers ways of passage are inquired into, to wit, whereby the audible Species, being carried into the annular Protuberance, do get both to the Brain and Cerebel; I say it is not improbable, but out of that Protuberance both a passage lyes open into the underlying tract of the oblong Marrow, and as it were the high road; as also another passage is opened into the Cerebel through the medullar processes of the same Ring. But lest there should perchance be a confusion of the animal Spirits and the sensible Species, (which indeed can hardly be avoided) if the way made for their passage should lye open into various passages and manifold apertures; therefore concerning this it may well be supposed, that the Ideas of the Sounds pass through the Cerebel, when they are carried to the common Sensory; which region being first past, they are at length brought by a by-path, *viz.* through the orbicular Prominences to the chamfered Bodies: which perhaps is partly the reason, that in the Hearing the perception of the sense succeeds so late, and the impulse of the object, in respect of sight, follows so slowly.

Whilst therefore the audible Species passes through the Cerebel, in some men, it leaves in this region (for that it is of a soft temper, and fit for the receiving impressions) tracts and marks of it self, and so they obtain musical ears. But in others who have a harder frame of the Cerebel, they produce no tracts of the same Sounds, and therefore such are wholly destitute of the faculty of Musick.

As therefore we suppose the audible Species to pass through the Cerebel after this manner, a reason may be given from hence, wherefore Musick does not only affect the Phantasie with a certain delight, but besides chears a sad and sorrowful Heart; yea, allays all turbulent Passions excited in the Breast from an immoderate heat and fluctuation of the blood. For since the animal Spirits, serving for the motion of the *Præcordia*, are derived from the Cerebel; as the perturbations conceived in the Brain, the influence being transmitted hither by moving these Spirits in the Fountain it self, transfer the force of their Affections on the Breast; so the Melody introduced to the Ears, and diffused through this Province, does as it were inchant with a gentle breath the Spirits there inhabiting, and composes them, called off from their fury, to numbers and measures of dancing, and so appeases all tumults and inordinations therein excited.

From theſe may in ſome meaſure be known the reaſon of the difference, why the hearing Nerves are after a different manner in man and in four-footed beaſts: for, becauſe in theſe there is little need that the audible Species ſhould paſs through the Cerebel, either for the reciprocations of the ſound heard, by the voice, or for the impreſſing there the Tunes of the Harmony (for neither is Muſick required, whatever Poets feign, to the taming the Affections which move the breaſts of beaſts) therefore in theſe (I mean in four-footed beaſts) the annular Protuberance diſpenſing the animal Spirits to the auditory Nerves, and receiving from them the ſenſible Species, requires not ſo ſtrict an affinity with the Cerebel: yea, whenas it may ſuffice, that thoſe Nerves ariſe from the oblong Marrow, yet the annular Protuberance, as it were a common Porch, ought to be prefixed to them; to wit, in which both the Spirits going out from either ſide, and the ſenſible Species to be carried to either, ought firſt to be mixed and united together, leſt otherwiſe every ſound ſhould become double.

Among the Nerves which are ſeen to belong to the Cerebel, and to perform its offices, laſtly follow the eighth or wandring pair, which indeed hath its riſe out of the common Trunk of the oblong Marrow, near the place where the laſt proceſs of the Cerebel is terminated, and over againſt where the pyramidal bodies, being produced from the annular Protuberance, end: ſo that we think theſe Nerves alſo, by that proceſs coming between on either ſide, and alſo perhaps in ſome meaſure through the paſſage of the pyramidal bodies, do derive all manner of influence of the animal Spirit from the Cerebel.

The beginning of theſe conſiſts of very many fibres and filaments or little threads preſently diſtinct one from another; to which belongs, from the very beginning of every Nerve, a noted Trunk ariſing out of the ſpinal Marrow. The deſcription of the wandring pair of Nerves, and its protenſion into the *Præcordia* and ſome *Viſcera*, are added hereafter. For the preſent it ſhall ſuffice, that we take notice, that for as much as this Nerve is beſtowed chiefly on the *Præcordia*, the acts whereof are involuntary, and are performed without our care or knowledge in ſleep as well as waking; and for that the ſame Nerve ſeems to receive the forces of the Spirits wholly from the nearer fountain of the Cerebel; from hence it may certainly be well concluded, that the government or œconomy of the Cerebel regards only the involuntary Function.

So much for the Nerves, which being ſubjected to the Government and Laws of the Cerebel, ſeem to obey and ſerve under it: among which moreover ought to be placed the fourth pair, or the pathetick Nerves of the Eyes, to wit, which ariſing out of the firſt proceſſes of the Cerebel, come between that and the orbicular Proceſſes; of the uſe of which we have ſpoken already. Further, we ſhall here take notice, that ſome other Nerves to be deſcribed below, for that they communicate with the aforeſaid Nerves near their originals, cauſe alſo ſome involuntary acts to be performed; of which ſort are firſt the ninth pair, the ſpinal Nerve acceſſory to the wandring pair, alſo the Nerve of the Diaphragma, and ſome others, as we ſhall ſhew more at large in the particular Hiſtory of the Nerves.

We may alſo obſerve, concerning the Nerves but now deſcribed, which owe their ſtock to the Cerebel, and ſeem to be deſigned for the offices of the involuntary Function, that ſometimes ſome of them, though of another Dominion, are compelled to obey the beck and government of the Brain: for we are wont to draw the parts of the Face, uſually moved pathetically and unthought of, and alſo at our pleaſure, into theſe or thoſe Configurations or poſtures: we are able alſo in a meaſure to alter the motions and actions of the *Præcordia* and *Viſcera* at the will or command of the Appetite. The reaſon of theſe is, partly becauſe the Nerves of either Government communicate variouſly among themſelves with ſhoots ſent forth one to another, ſo that oftentimes the offices of the one are drawn into the parts of the other. But beſides, we have mentioned before, that the ſenſible impreſſion being inflicted on the parts of the involuntary Function, foraſmuch as it is vehement, like a ſtrong waving of water, paſſing through the Cerebel, affects the Brain it ſelf. In like manner it may be thought concerning the motion which belongs to thoſe parts, *viz.* that made after the ordinary manner, that it is performed by the command of the Cerebel. Notwithſtanding ſome more ſevere Edicts of the Brain, by the by-paſſage of the Prominences, belong alſo to the Cerebel, and determine the Offices of the Inhabitants of it to be performed at the beck of the Appetite. As every one ſees that violent Paſſions (whether

(whether the will be privy or not) eaſily do this; why therefore may not the will it ſelf alſo, as occaſion requires, exerciſe the ſame dominion? But in the mean time, this derogates nothing from the priviledges of the Cerebel, that it may not be called a free and municipal City, and ſo Miſtreſs of the involuntary Function; for that in ſome few it is after the manner of the Brain: becauſe the Brain it ſelf in many things is compelled to ſerve the Cerebel and its Government, as we have already ſhewn, and is neceſſarily bound to it. For the Brain owes much to the Cerebel, foraſmuch as it receives from the vital Function (which is of its Province) the proviſion of the blood, and by conſequence the Tribute of the Spirits produced of it: ſo indeed that both theſe parts, though Principals, perform mutual offices, and as it were in a circle, require and accompliſh ſervices one for another.

CHAP. XVIII.

Of the relation or mutual reſpect of either Appendix of the Cerebel, to wit, of the anterior, which are the orbicular Prominences; and the poſterior, viz. *the Annular Protuberance: Alſo of the remaining portion of the oblong Marrow continued into the Spinal Marrow.*

BEſides the aforeſaid Nerves, to wit, the fourth, fifth, ſixth, ſeventh, and eighth pair which are imployed for the performing the tacit Edicts of the Cerebel for every involuntary Function, and thoſe equal in number to the reſt ſubject to the Brain, that cauſe the Cerebel to have an Empire divided with it; there are alſo ſome Proceſſes and Protuberances, which being placed before and behind the Cerebel, are its Appendixes, that are taken into part of the ſame Office and Miniſtry. The deſcription and uſe of theſe, are already particularly delivered. But for that (as a while ſince we intimated) there happens a certain reſpect or habit between the orbicular Prominences, which is the anterior Appendix of the Cerebel, and the annular Protuberance, which is the other poſterior Appendix of the ſame, and that one part is proportionate to the magnitude of the other; ſo as when the natiform Prominences are greater or greateſt, the annular Protuberance is always ſmaller or ſmalleſt; and on the contrary, they who have this latter in a very great bulk, in them the other is leſſer; and ſo for that either part ſeems to be a peculiar Repoſitory of the Spirits, which belong to the œconomy of the Cerebel, when a greater proviſion of them is laid up in one Store-houſe, therefore there reſides a leſſer in the other; when I ſay there is this kind of conſtant relation found between theſe parts, it yet remains for us to find out for what end this is ſo conſtituted.

Seeing that the animal Spirits are diſpoſed within the ſeveral parts of the Head in diſtinct Schemes of Rays, through which are variouſly tranſmitted, as through Perſpective-glaſſes, the impreſſions of ſenſible things and the inſtincts of motions to be performed; it eaſily occurs, that there are commerces had this way and that way in the natiform Prominences between the Brain and Cerebel; and that the Spirits inhabiting the annular Protuberance are *Internuncii* or Meſſengers going between, which transfer the mutual reſpects of the *Præcordia* and *Viſcera*, as alſo of the parts that are wont to be pathetically moved. But if it be inquired into, what kind of commerces and reſpects thoſe are which the Brain carries to the Cerebel, and on the contrary, and that either have to the Organs of the vital and merely natural Function, we ſhall in ſo difficult and very intricate a matter propoſe our Opinion, though with an heſitating and doubtful mind.

We have before intimated, that the orbicular Prominences did deliver to the Cerebel the forces of the Paſſions to be carried from the Brain to the *Præcordia*, and did receive from it, and communicate to the Brain the neceſſities of the natural Inſtincts delivered from the *Præcordia* and *Viſcera* to the Cerebel. To theſe moreover we add, that the annular Protuberance ſerves wholly for the ſame offices, though after another manner; to wit, this receives the forces of the Paſſions, as it were at a ſecond hand, from the Deputiſhip of the Cerebel, and transfers them then immediately to

the *Præcordia*; and this ſeems to be the chiefeſt office of this part. Further, the ſame Ring receives immediately the natural Inſtincts from the *Viſcera* of the middle and loweſt Belly, and impreſſes them on the Cerebel to be conveyed further to the Brain; which kind of uſe it exhibits ſecondarily by affording only a way of paſſage: For indeed ſuch Inſtincts having paſt through the Cerebel, we ſuppoſe to be formed and perfected within the orbicular Prominences, from whence being tranſmitted into the Brain, they draw forth requiſite actions without the previous knowledge of it, or intention of doing.

Hence it may be ſuppoſed, that the annular Protuberance contains chiefly the animal Spirits which perform the inteſtine commotions of the Affections. In every violent paſſion of the Soul, preſently the *Præcordia* are greatly troubled, to wit, the ſame being variouſly drawn together or ſpread abroad, compel the blood into divers fluctuations; but indeed a great company of the Spirits, ſomewhere got together and ready for Excurſions in a ſet Battel, do perform theſe diſorders and irregular motions of the *Præcordia*; and for that the Spirits can be diſpoſed for this in no other part than here, before the beginnings of the Nerves, conſtituted for theſe offices; therefore this Protuberance in a man, by reaſon of the ragings of the Paſſions to be performed by a certain force and incitation, is far greater than in any other Animal. For as he is wont to be ſuddenly and vehemently diſturbed, therefore the Promptuary or Store-houſe is required to be more large, in which a greater plenty of Spirits may be kept, to be beſtowed on ſuch inordinations of the Affections. Next to a man this part is greateſt in a Dog, Cat, and Fox; in a Calf, Sheep, Goat, Hare, and other milder Animals it is very ſmall.

But as the annular Protuberance ſeems to be the chief Organ or Cheſt of the Spirits, from whence the winds of the Paſſions, deſtinated for the exciting the *Præcordia*, are conveyed into the breaſt; ſo we ſuppoſe the orbicular Prominences to be a means of paſſage, and the very inſtruments whereby the inſtincts and neceſſities of the *Præcordia* and *Viſcera* are communicated from the Cerebel to the Brain. Yea, the animal Spirits dwelling in this, as a retiring place, do not only tranſmit theſe kind of Ideas or formal Reaſons of the Inſtincts, but in ſome meaſure form and prepare them for the Brain. For when as ſome brute Animals, whoſe Brain is not imbued with a previous knowledge or practical habits, chuſe and bring forth ſome ſpontaneous actions as it were with judgment and deliberation, certainly we may believe the intentions of theſe kind of acts are ſuggeſted from ſome other place than the Brain, to wit, from the aforeſaid Prominences. Wherefore 'tis to be obſerved, that in ſome Brutes endued with an indocil or dull Brain, the Buttock-like Prominences are greateſt, as may be ſeen in a Calf, Sheep, Hog, and many others; which Animals, as ſoon as they are brought to light, preſently ſeek for their food, and what is congruous for them they readily know. But in a Man, a Dog, Fox, and the like, who are more apt to learn and acquire habits, theſe Prominences are very ſmall; and theſe Animals being newly born, are furniſhed only with a rude and imperfect ſenſe; beſides, they are found wholly unapt to ſeek out their food. Upon this Obſervation (which holds good in moſt Animals which I have yet happened to diſſect) as upon a Baſis or foundation I dare build this kind of abſtruſe Hypotheſis concerning the natural Inſtincts and Affections of the *Præcordia*. For as the living Creatures which are more ſtrong in inſtinct, as Sheep, Hogs, Oxen, Goats, and other ſlow and gentler beaſts, that are not obnoxious to Paſſions, are alſo leſs docile or apt to learn; and on the contrary, they in whom the Affections are wont to predominate, and who are furniſhed with a certain wit, (as beſides Man, are Dogs, Foxes, and ſome other hotter Animals) are leſs powerful in Inſtinct: and as I have obſerved in the frequent Diſſection of all ſorts of Heads, that in thoſe kind of living Creatures, who live rather by Wit than Inſtinct, the annular Protuberance, placed below the Cerebel, was notedly great, and the orbicular Prominences only very ſmall; but in other living Creatures, where the Inſtinct exceeded the wit, and who were leſs prone to ſtrong Affections, the orbicular Prominences were very great, and on the contrary, the ringy Protuberance exceeding ſmall: From hence I was forced to think, that the orbicular or natiform Prominences, where they are great, are inſtead of another or ſupplementory Brain, and the chief Organs of the natural Inſtincts; yet ſo, as theſe parts alſo ſerve for a way or means of paſſage for the transferring the Paſſions from the Brain towards the Cerebel and *Præcordia*; and that (as we have already hinted) the greater exiſtency of the annular Protuberance is to contain plenty of Spirits requiſite

quiſite for the winds of the Paſſions; yet in the mean time, by a further tending forwards or declination of the Spirits inhabiting this, the Species of the natural Inſtincts, being ſent from the *Præcordia* and *Viſcera*, paſs through. But however the buſineſs is, becauſe nothing can be certainly affirmed, or by demonſtration, if this our Opinion pleaſe not others, at leaſt it may be pardoned.

There remains not much more to be ſpoken concerning the Offices and Uſes of the Cerebel and its Appendix. Concerning its ſubſtance, there is ſomething more worthy taking notice of, to wit, that it very much differs in this reſpect from the ſtructure of the Brain alſo, for that its cortical little circles are not founded in the ſtretched out Marrow, as the convolutions of the Brain; but being deeply cut in, are diſcontinued in their whole tract: ſo that the whole Syſtem of the Cerebel is as it were a cluſter of Grapes compacted cloſely together; in which, although the Berries be contiguous, yet they remain diſtinct one from another, and bring forth fiſſures through the whole thickneſs of the maſs. Yea the outward ſuperficies of the Cerebel conſiſts as it were of very many Tubercles or little Tad-ſtoles or Puffs which grow together on little ſtalks; and thoſe ſtalks paſs into greater branches, and they at length being bipartite or twofold, go together into two larger Marrows near the bottom of the Cerebel, in either of which are three diſtinct medullary Proceſſes: of which threefold proceſſes on either ſide we have already ſpoken. But of theſe concerning the uſe of the Cerebel in general, we ſhall yet further advertiſe you, that as very much of its ſubſtance is cortical, it begets animal Spirits in great plenty, to which in the circulating there is not granted, as in the Brain, an equally great ſpace; for that there ſeems not to be much need of it in the animal Government. For the Spirits ſo produced in the Cerebel plentifully by a perpetual emanation, ought to flow outwardly for the offices of the natural and vital Function: but more inwardly for the impulſes variouſly ſent into them, they admit certain undulations or wavings, by which ſome occaſional acts of the involuntary Function are brought forth, as is ſhewn before.

But as it is manifeſt enough, that the animal Spirits are generated within the cortical little circles of the Cerebel, it doth not ſeem needful that we ſhould ordain their Work-houſe in the Ventricle ſubject to its frame. For that Cavity (as we have already ſhewn) is only an empty ſpace, which lying under its double little foot and medullar Trunk, comes between it and the overlying bunching out of the Cerebel. But indeed there belongs to this beſides a certain uſe, to wit, that the ſerous watry heap laid aſide out of the Glandula's and infoldings of the Veſſels, as alſo from the ſubſtance of the Cerebel, being made over-moiſt, diſtilling down, might ſlide into this Ciſtern. From whence, leſt it ſhould flow down upon the beginnings of the Nerves, by a reſtraining Membrane it is compelled into the hole of the ſtrait Den lying under the orbicular Prominences; and from thence is received from the declining aperture of the Tunnel, and carried out.

Below the Cerebel, the oblong Marrow going forward with the reſt of its tract even to the hole of the hinder part of the Head, ends at length in the ſpinal Marrow: but in its Trunk, as yet contained within the Skull, beſides the Nerves and Proceſſes but now recited, the beginnings of the ninth and tenth pair of Nerves are alſo radicated. Of which there will be hereafter a proper place to ſpeak, when we ſhall inſtitute the whole Neurology or the Doctrine of the Nerves. In the mean time, we ſhall take notice of the beginning of the ninth pair, which is peculiar in Man, and different from what is found in Brutes: To wit, in Man below the origine of the eighth pair, a certain Protuberance grows to either ſide of the oblong Marrow. Out of that four or five diſtinct Fibres do come forth; one or two of which binds about the Vertebral Artery paſſing through it, but all grow together into the ſame Trunk, which is the Nerve of the aforeſaid pair. This Protuberance, the *Pia Mater* being pulled away, may be eaſily ſeen, and ſeems to be the Repoſitory or Store-houſe of the Spirits deſtinated to this Nerve.

For as this Nerve is beſtowed on the Tongue and its Muſcles, and ſo conduces chiefly to the performing of ſpeech in Man, who hath a greater and more frequent uſe and exerciſe of the voice, there ſeems to be need of a great proviſion of Spirits, plenty of which ought always to be in a readineſs. But in Brutes, who have none, or a rarer neceſſity of the voice, ſuch a Protuberance is wanting, becauſe it is not required in them that the Spirits ſhould be gathered together by heaps, as it were in a certain Porch, before the Organs of the Voice, but that it may ſuffice for them to be

be called forth by degrees out of the common tract of the oblong Marrow. Further, whereas ſome fibres of this Nerve bind about either Vertebral Artery, unleſs I am deceived, that is ſo ordained for this end, leſt perhaps in ſpeaking, when at any time we are more vehemently moved, the blood being ſtirred up, might ruſh upon the Brain with a torrent. For this Nerve binding about the Vertebral Artery, as it were with a bridle, and ſo as a Moderator not only of the Tongue, but alſo of the Blood, reſtrains its more rapid influence. After the ſame manner, and for no other ends, do the recurrent Nerves, deſtinated to ſome part of the ſame office, variouſly bind about the Trunk of the great Artery, as ſhall be ſhewn afterwards.

As ſoon as this inferior portion of the oblong Marrow is uncloathed from the *Pia Mater*, the pyramidal bodies come in view otherwiſe lying hid. Theſe in all Animals, endued with the annular Protuberance, are conſtantly found; alſo as that Protuberance is bigger, ſo theſe bodies appear more noted: but indeed in a Man and a Dog they ſeem like two large Nerves, which being produced out of that Ring, end over againſt where the eighth pair ariſe in ſharp points. If the uſe of theſe be ſought into, it is moſt likely, that the animal Spirits ſuperabounding in the annular proviſion or ſtore, do flow out as it were by theſe Emiſſaries, which Spirits however run into the beginnings of the eighth pair placed near, and ſo are beſtowed by their proper means on the offices of the involuntary Function.

Although the oblong Marrow retains not its name beyond the limits of the Skull; yet it is the ſame ſubſtance, which from thence being continued further into the cavity and utmoſt receſſes of the whole Spine or Back-bone, is called the Spinal Marrow: but it is brought forth for this, that the Nerves to be diſtributed into the Limbs and Members more remote from the Head, might more commodiouſly ariſe out of the ſame medullar ſubſtance ſtretched out into the neighbourhood of every part. Indeed all this whole medullar Trunk, which is continued from the bottom of the Brain even to the *Os ſacrum*, ſeems like the Pneumatick Cheſt, or Bellows of a pair of Organs, which includes the blaſt or breath deſtinated to every Pipe; for in like manner the animal Spirits are contained in this marrowy tract, which blow up and actuate all the Nerves hanging thereto, as occaſion ſerves.

If you behold the origine of the whole, it ſeems that the whole frame both of this oblong Marrow and the ſpinal, is of a medullar or marrowy ſubſtance, every where growing diſperſedly through the Brain and Cerebel, and then being gathered more round together in the middle of either, becomes as one heap. For the Marrows beſmearing all their folds and turnings about, are as ſo many little rivers, which ſpringing from thence, begin to be congregated in the middle, and to be poured out in one great one; but being from thence united, they make the oblong Marrow, as it were the chanel of the Sea, big enough for the motion or ebbing and flowing and reciprocation of the animal Spirits: which belly or chanel, however ſtretching it ſelf further beyond the Skull, is increaſed into the ſpinal Marrow, as it were the boſom or proceſs of the former.

But as the medullar tracts, beſmearing the folds and convolutions of the Brain and Cerebel, unfold themſelves into their middle Marrows and medullar Trunk, and ſo the Spirits ſpringing diſperſedly from their firſt fountains, congregate as it were into a certain diffuſed Sea; ſo from this Sea, cauſing an ebbing and flowing, or a continual or very frequent influence of the animal Spirit, the ſame Spirits flow out into the depending chanels of the nervous Syſtem.

Concerning this part of this Marrow, which being included in the long boſom or chanel of the *Vertebræ* or Back-bone, and according to all their joyntings, being marked with as it were knotty proceſſes, is called the Spinal, there occur not many things worthy conſideration, beſides what are commonly known. The figure, ſituation, as alſo the body of this, in its whole tract, are known generally to be cloven in two, not only by Anatomiſts, but by every Butcher. The ramifications or branchings of the Nerves, proceeding from the ſpinal Marrow, are delivered hereafter. Concerning its conformation ſomething peculiar occurs. For as the ſpinal Marrow is as it were the common paſſage or chanel of the Spirits flowing out of the Head into the Nerves, it may be obſerved, that this chanel, not after the uſual manner of other paſſages, where many rivers flow in, doth ſwell up more; but on the contrary, in what place it hath more and greater Emiſſaries, its magnitude is increaſed; for in thoſe parts of the ſpinal Marrow, out of which the brachial and crural Nerves ariſe, (or thoſe Nerves belonging to the Arms and Legs, whoſe beginnings are more and larger)

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its Trunk becomes much thicker than in the reſt of the frame or ſubſtance. The reaſon of this is, becauſe within the medullar tracts the animal Spirits run not, nor paſs through with ſo ſwift a paſſage, but for the moſt part flowing leiſurely from their Fountains, when they have filled the whole ſpace, they ſtay therein; and as many Spirits, upon occaſion offered, are wont to be beſtowed on every work, thoſe remaining there in readineſs frame certain convenient Promptuaries where they may divert themſelves. Wherefore we ordinarily obſerve, not only of this Marrow, but of the Nerves themſelves, that as often as a ſmall branch is diſtributed into many ſhoots or ſuckers to be ſent forth here and there, always in the very knot of the diviſion there grows a far greater fold than in the reſt of the Trunk of the Nerve; ſo that 'tis a wonder from whence the Nerve ſhould acquire ſo in the middle of its paſſage a new ſubſtance and more ample bulk. But of theſe things and others belonging to the Doctrine of the Nerves, it behoves us to diſcourſe in the following Chapters.

CHAP. XIX.

Of the Nervous Syſtem in general, where its parts (which are the Nerves and Fibres) being deſigned, a proſpect of the whole Animal Government is exhibited.

WHenas hitherto having beheld the ſeveral Regions of the Brain it ſelf, the Cerebel, and medullar Appendix, and the proviſion and offices of them all, we have deſigned or drawn forth the uſes and employments alſo of the parts and proceſſes, and the ſanguiferous Veſſels belonging to every one of theſe; it is now time for me to ſtop and retire into the Port from this troubleſom and intricate Sea of Diſquiſition: But indeed, becauſe I find that I have not yet reached to the fartheſt ſhores and utmoſt parts; but that beyond this Sea, which we have ſailed through, as yet the nervous Syſtem, and very many Creeks or Boſoms, Meanders, and highly intricate Receſſes or private places in it remain to be viewed; therefore although we know it is difficult to proceed with full Sail, we have reſolved to undertake the task of the Doctrine of the Nerves; and the rather, becauſe without the perfect knowledge of the Nerves the Doctrine of the Brain and its Appendix would be left wholly lame and imperfect; for neither what hath already been delivered concerning them can be ſufficiently underſtood or illuſtrated, nor (which I chiefly deſire, and is the end of the former Diſquiſitions) without thoſe things before known can the Pathology of the Brain and nervous ſtock be rightly inſtituted. And indeed there are many things which might eaſily deter any one from ſuch an undertaking: to wit, the hardneſs of the work, and full of hazard; which promiſes at firſt ſight more difficulty and thorny labour, than pleaſure or profit. Then ſome will object, that this Province is already ſo perfectly cultivated, and adorned by former Anatomiſts, that by a repetition of the ſame, I may ſeem to have medled with a thing done to my hand. But I may readily anſwer to theſe, firſt, That the Anatomy of the Nerves yields more pleaſant and profitable Speculations, than the Theory of any parts beſides in the animated Body: for from hence the true and genuine Reaſons are drawn of very many Actions and Paſſions that are wont to happen in our Body, which otherwiſe ſeem moſt difficult and unexplicable; and no leſs from this Fountain the hidden Cauſes of Diſeaſes and their Symptoms, which commonly are aſcribed to the Incantations of Witches, may be found out and clearly laid open. But as to our Obſervations about the Nerves, from our following Diſcourſe it will plainly appear, that I have not trod the paths or footſteps of others, nor repeated what hath been before told.

Therefore that according to our determination we may enter upon the explanation of the nervous Syſtem, we ſhall comprehend under this name all parts, upon which gifted with the animal Spirit, Motion and Senſe neceſſarily and immediately depend, to wit, for the performing either one only, or both together in the whole Body. But theſe kind of parts, in reſpect of the Head and marrowy Appendix, are like a branching ſtock or imps growing out of the trunk of a Tree: for ſuppoſing that the

the cortical ſubſtances of the Brain and Cerebel are in the place of roots, and that the ſubſtances every where medullar are taken for the ſtock or pith; the nervous germination or budding forth expanded into divarications of Nerves and Fibres, will appear like ſo many little branches, twigs, and leaves. Or if the Head containing in it ſelf the chief part and power of the ſenſitive Soul, be taken for the body of ſome Luminary, as of the Sun or a Star; the nervous Syſtem ſhall be that radiant or beamy concretion compaſſing it about. Becauſe the animal Spirits flowing from the Brain and Cerebel, with the medullar Appendix of either, as it were from a double Luminary, irradiate the nervous Syſtem, and ſo conſtitute its ſeveral parts, the Organs of Motion or Senſe, or of both together, as hath been ſaid.

The parts of the nervous Syſtem, as a radiant or beamy texture, are either primary, *viz.* the bodies themſelves of the Nerves, into which the animal Spirits immediately flow from the Head and its medullar Appendix; or ſecondarily, which are Fibres planted or interwoven in the Membranes, muſculous Fleſh, Tendons, and ſome of the Parenchyma, which alſo contain in themſelves animal Spirits, but they receive them not but mediately and ſecondarily derived from the Head through the bodies of the Nerves.

We have already ſhewed that the animal Spirits are procreated only in the Brain and Cerebel, from which they continually ſpringing forth, inſpire and fill full the medullar Trunk: (like the Cheſt of a muſical Organ, which receives the wind to be blown into all the Pipes) but thoſe Spirits being carried from thence into the Nerves, as into ſo many Pipes hanging to the ſame, blow them up and actuate them with a full influence; then what flow over or abound from the Nerves, enter the Fibres diſperſed every where in the Membranes, Muſcles, and other parts, and ſo impart to thoſe bodies, in which the nervous Fibres are interwoven, a motive and ſenſitive or feeling force. And theſe Spirits of every part are called Implanted, foraſmuch as they flow not within the Nerves, as the former, with a perpetual flood; but being ſomething more ſtable and conſtant, ſtay longer in the ſubject bodies; and only as occaſion ſerves, *viz.* according to the impreſſions inwardly received from the Nerves, or impreſſed outwardly by the objects, are ordained into divers ſtretchings or carryings out for the effecting of motion or ſenſe either of this or that manner or kind.

Indeed the animal Spirits flowing within the Nerves with a living Spring, like Rivers from a perpetual Fountain, do not ſtagnate or ſtand ſtill; but ſliding forth with a continual courſe, are ever ſupplied and kept full with a new influence from the Fountain. In the mean time, the Spirits in the reſt of the nervous kind, eſpecially thoſe abounding in the Membranes and muſculous ſtock, are like Ponds and Lakes of Waters lately diffuſed from the chanels of Rivers, whoſe waters ſtanding ſtill are not much moved of their own accord; but being agitated by things caſt into them, or by the blaſts of winds, conceive divers ſorts of fluctuations.

But becauſe there is no light difference between the motions and conſiſtency of the Spirits and of Waters, perhaps it will better illuſtrate the matter, if the Spirits of either kind, to wit, the inflowing and implanted, are compared to the beaming forth of divers rays of light. And ſo when light is let into a dark chamber, and preſently inlightens the whole, we may conceive the particles of the light ſo ſwiftly diffuſed to be of a twofold kind; to wit, ſome are bodies ſent from the light it ſelf, which diffuſe themſelves every way into an Orb; and other luminous particles are as it were Etherial little bodies exiſting before in the pores of the Air, which being agitated by the former, and as it were inkindled, cauſe as it were a flamy, though moſt thin contexture, ſtretched out in the whole clearneſs. After the like manner, the animal Spirits flowing from the medullar ſubſtance into the Nerves, are as it were rays diffuſed from the light it ſelf, and the other Spirits every where abounding in the Fibres, are as ſo many lucid particles included and implanted in the Air, which are actuated by the former, and being ſtirred up by them into motion, perform the acts both of the ſenſitive and locomotive Faculty.

That it may the better appear by what means the animal Spirits do irradiate and ſwiftly paſs through the parts of the nervous Syſtem, both primary and ſecondary; ſo that light is ſcarcely carried ſwifter through a diaphanous Medium, than the communication of the Spirits is made from one end of the nervous Syſtem to the other; it will be requiſite to inquire here a little concerning the Origine of the Nerves and nervous Fibres, alſo of their Fabrick and Conformation, to wit, what pores and paſſages either of theſe bodies have, and how diſpoſed for the paſſing through and commerce of the animal Spirits.

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As to the Nerves, it is manifeſt from what hath been ſaid, that all of them are produced immediately out of the medullar Trunk or its proceſſes; ſo that as theſe parts are the common and broad roads which lead both from the Brain and from the Cerebel, all the Nerves are particular paths reaching out from them on every ſide into the ſeveral Regions of the animated Body. Wherefore the ſame Marrow, which is the original of every Nerve or Sinew, foraſmuch as it is drawn into a more thin thread, conſtitutes the matter of the ſame Nerve; which indeed, that it may be made more ſolid and compact, is cloathed with a peculiar production of the *Pia Mater*: for as from a Silver maſs gilt or inriched with Gold, all the threads produced from it are gilded; ſo the ſame Membrane, which covers the medullar Trunk, is produced together with all the Nerves coming out from the ſame, and cloathes them all. Further, very many Nerves ariſing together out of that marrowy beginning, go forth as it were by bands; which notwithſtanding, for the ſake of the better paſſage, being preſently united and carried out of their bony Cloiſter, are included in a common Coat taken from the *Dura Mater*. For we ſuppoſe (which alſo ſhall be more clearly ſhewed anon) that all the Nerves, deſtinated to any parts or every particular member, do ariſe diſtinctly and apart, and ſo remain in their whole paſſage. But in that oftentimes a Nerve appearing as it were one Trunk, afterwards ſeems to go into many branches, it is becauſe thoſe branches being indeed ſingular, and divided in the whole paſſage, are collected as it were into one bundle; for ſometimes we have ſeparated thoſe Nerves, ſeeming to grow together as it were into one rope or cord of a Nerve, one from another, dividing them to their very original; for neither otherwiſe could the Inſtincts of the Motions to be performed be carried ſo reſpectively to theſe or thoſe parts, ſeparate one from another, to which the branches of the ſame Trunk belong.

The paſſages of the Nerves are not bored through as the Veins and Arteries; for the ſubſtance of thoſe are not only impervious to any Bodkin, but no cavity can be ſeen in them, no not by the help of Spectacles or a Microſcope. As to what belongs to the ſmelling little Pipes, they ſeem to be ſo made, not for the paſſage of the animal Spirits, but that ſome ferоſities might ſlide down that way: but the Spirits themſelves are carried in the ſides, and not in the cavity of either Pipe; but the ſubſtance of the other Nerves appears plainly firm and compacted, that the ſubtil humor, which is the Vehicle of the Spirits, may paſs through their frames or ſubſtances, even as the ſpirits of Wine, the extended ſtrings of a Lute, only by creeping leiſurely through. Hence it may be argued, that becauſe the animal Spirits require no manifeſt cavity within the Nerves for their expanſion; neither is there need of the like for them within the ſubſtance of the Brain; but that the Ventricles, commonly ſo called, ought to be deputed to ſome other office than this.

But the Nerves are white, ſmooth, and round bodies: within the Skull and nigh their beginnings, being as it were only covered with the *Pia Mater*, they are ſoft and eaſily broken; without this, for that many of them are for the moſt part gathered together, and alſo cloathed with the *Dura Mater*, they become ſomewhat hard and more tenacious. The Nerves themſelves (as may be diſcovered by the help of a Microcoſm or Perſpective-glaſs) are furniſhed throughout with pores and paſſages, as it were ſo many little holes in a Honey-comb, thickly ſet, made hollow, and contiguous one by another; ſo the Tube-like ſubſtance of them, like an *Indian* Cane, is every where porous and pervious. Within theſe little ſpaces the animal Spirits or very ſubtil little Bodies, and of their own nature ever in a readineſs for motion, do gently flow; to which is joyned, both for a Vehicle, as alſo for a Bridle or ſtay, a watry Latex, and that it ſelf of very ſubtil parts, This Humor diffuſes with its fluidity the Spirits through the whole nervous Syſtem; alſo by its viſcoſity retains them, that they be not wholly diſſipated, but as it were in a certain *Syſtaſis* and continued Series; for it ſeems, that without ſuch an Humor the Spirits could not conſiſt within the nervous ſtock, but they would vaniſh away into Air. Further, the ſame Humor is no leſs required for the paſſing through of the ſenſible Species: becauſe the animal Spirits, we ſuppoſe, like the rays of Light, to be diffuſed through the whole nervous Syſtem; and thoſe rays, unleſs the humid particles of the Air be mingled with them, do not eaſily tranſmit the forms or images of things; as is obvious in an Optick Scene, which is hid or ſhadowed by the clear beams or brightneſs of the Sun. And in like manner, from the defect or depravation of the nervous Juyce, we can readily ſhew, that the inordinations of the animal Spirits, and oftentimes moſt horrid diſtempers of the Brain and the nervous ſtock do ariſe.

This nervous Juyce being derived from the Brain and Cerebel into the medullar Appendix, is carried from thence by a gentle ſliding down through the Nerves even into the whole nervous ſtock, and waters its whole Syſtem. Upon the equal emanation of this depends the expanſion of the animal Spirits through the whole; and the ſubſtance of theſe, yea the Hypoſtaſis of the ſenſitive Soul it ſelf is founded on the diffuſion of the ſame humor. The animal Spirits being left to themſelves, follow the motion of this Juyce, and flowing together with it in the ſame courſe, are pleaſingly or quietly expatiated; but in the mean time, as occaſion is offered, the ſame Spirits, as a breath moving upon thoſe waters, conceive other ſpreadings abroad, and thoſe more rapid. For as in a River, from winds or any thing caſt in, divers undulations or wavings are ſtirred up; ſo the animal Spirits being raiſed up by objects for the performing the offices of ſenſe and motion, do tend this way or that way to and fro within the nervous ſtock, and are agitated hither and thither by other means.

But to return to the parts of the nervous Syſtem, beſides the Nerves themſelves, Fibres alſo being diſperſedly interwoven in the Membranes, the muſculous Fleſh, the Parenchyma, and other parts, and united in the Tendons, are the Organs of ſenſe and motion. Yea, the acts of their faculties are principally and more immediately executed by the Fibres than the Nerves; for they, by drawing together the Muſcle and other motive parts, cauſe the motion it ſelf; but the Nerves only carry from the Head the inſtinct for the performing of that motion. In like manner, in Senſation the Fibres receive firſt of all and immediately the impreſſions of ſenſible things, and expreſs the ſame (as muſical ſtrings do the ſtrikings of a quill or fingers) by an intrinſecal modification of the Particles, and repreſent the various approaches of the object by the like motion of the Fibrils, as by a moveable and fluid Character, whoſe Idea the Nerves transfer only to the Head.

Concerning the nervous Fibres it behoves us to inquire from whence they have their riſe? For it appears plainly, that they ariſe not immediately from the Head or its medullar Appendix; nor is it leſs improbable, that they are produced (as 'tis commonly ſaid) from the Nerves: becauſe what is aſſerted, that the Fibres are productions of the Nerves, and little bits or pieces of them torn off, as it were into hairy branches, ſeems unlikely; for that the Fibres in ſome parts, being placed nigh, exceed in their bulk the magnitude of the Nerve that is brought to that part, at leaſt an hundred-fold: which thing appears clearly from the Tendon of every Muſcle, which being made up of united Fibres, is obſerved to be far greater than the Nerve inſerted to it. And indeed for almoſt the like reaſon we are induced to think the nervous Humor it ſelf alſo, whereby the Membranes and muſculous Fibres are wont to be watered, to be derived unto them not by the only means and paſſage of the Nerves; becauſe it is heaped up much more plentifully and in more abundance than can be carried thither through thoſe narrow paſſages, as appears clearly in Ulcers of the Kings Evil, or in Impoſtumes or Wounds of the Tendons and nervous parts, in which a glutinous Humor drops forth in ſo great abundance, that all the Nerves of the whole Body could ſcarce be able to ſupply it.

Wherefore concerning theſe, it ſeems that we may affirm, that the Fibres are not continued portions of the Nerves broken off into little hairy ſtrings or Capillaments; and that all the Fibres originally proceed not from the Nerves, becauſe ſome of them, *viz.* thoſe interwoven to the Heart and its Veſſels are of equal birth with the Nerves themſelves, and coexiſt with them together from the beginning. However moſt Fibres, as to their production, depend upon the Nerves; and all, which way ſoever brought forth, receive conſtantly from the Nerves the forces and ſupplements of the animal Spirits, and alſo the Inſtincts of the Motions to be performed by them.

Therefore to recount the births or kinds of Fibres; they are firſt either ſpermatick and firſt begotten, the rudiments or firſt beginnings of which being of the like antiquity as the Heart and Brain, placed in the Conception, afterwards leiſurely increaſe; to wit, ſuch are, as hath been ſaid, thoſe in the Heart it ſelf in its depending Veſſels, the Membranes and ſome other parts, which form the firſt ſtuff or threads of the Embryo: or ſecondly, other Fibres are produced ſecondarily, and by a ſecond birth; of which ſort chiefly are ſuch which are interwoven into the parts taken for the compleating of the animal Fabrick, and eſpecially thoſe termed Sanguineous, which we think to be begotten after this manner.

The Heart and Brain, with the Arteries and Nerves hanging to them, are primigenious parts, and highly original; but theſe, for the ſecond birth of others, and

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for the nutrition and increaſe of all the ſenſitive parts, diſtribute a twofold humor: *viz.* one ſpirituous and endued with very active Particles which perpetually flow, though but in a very ſmall quantity, through the paſſages of the Nerves from the Brain and Cerebel; and the other ſlow and ſofter, which being every where laid aſide through the Arteries from the bloody maſs, is rendred more plentifully. This latter being of it ſelf dull and thicker by much, is actuated by the former, and being imbued by it, as by a certain Ferment, acquires ſtrength and power of growth or vegetation. But indeed the nervous Juyce, foraſmuch as it diffuſes with it ſelf the animal Spirits, imparts to every part, beſides the faculties of Motion and Senſe, the determinations alſo of form and figure. Further, whilſt that, being joyned to the other arterious humor, is diſpoſed into the ſubſtance and matter of the member or part to be nouriſhed, it forms ſome tracts as it were, to wit, the Fibres themſelves, in which the animal Spirits, coming together with them, reſide and are expatiated. Theſe twofold or twin humors, coupling together in every ſenſitive part, conſtitute a liquor truly nutritious, to wit, which is both ſpirituous and nouriſhable. And in truth, both theſe Juyces, *viz.* the nervous and arterious, being married together, are as it were the male and female ſeed, which being mingled in a fruitful womb, produces the plaſtick Humor, by whoſe virtue the living creature is formed and increaſes. Hence may be obſerved, as the particles of the ſpirituous liquor, or of the other more watry juyce (*viz.* this latter being ſupplied from the Arteries, or that from the Nerves) are ſtrong or excel, as to their properties or powers, all living creatures become more or leſs nimble, active, and ready to any motion and labour. Beſides, from the default or depravation of the one and the other humor excelling, the ſorts or kinds of this or that diſeaſe are excited; concerning which, and alſo what belongs to the explication of the nutritious Humor, we may perhaps have ſome other time occaſion to diſcourſe.

The animal Spirits which enter and fill the ordained ſeries of the Fibres as ſo many little places, flow thither by the paſſages of the Nerves; notwithſtanding the Spirits which are ſeated in the Fibres, interwoven with the muſculous ſtock, receive nouriſhment, yea and as it were auxiliary forces, from the arterious blood there plentifully flowing: whereby indeed both the Spirits themſelves acquire for the performing of Motions a greater force and as it were elaſtick; ſo that their force being ſtirred up by a ſtrong endeavour, it ſeems like the exploſion of Gun-powder; and alſo the ſame Spirits being continually conſumed within the Muſcles more profuſely than is wont to be in the Membranes and other parts, are in ſome meaſure made up or repaired from the bloody ſuſtenance: becauſe whenas the arterious Juyce joyns more plentifully with the nervous flowing within the ſanguineous parts, it may be well thought, that it alſo lays upon the Spirits brought thither with it, as it were ſome nitroſulphureous particles, and intimately fixes them on them; and ſo, by reaſon of this Copula, highly flatuous and apt to be rarified, the Spirits themſelves become there more active, ſo that in every motive endeavour, whereby the Muſcle is ſuddenly intumified, they, as if inkindled, are exploded. Moreover, a ſudden refection of the conſumed or waſted Spirits, after great exerciſe or labour, is for this reaſon alſo performed by the blood; for that the ſpirituous particles being left and forſaken by motion, preſently a new Copula of the ſame kind of matter, apt for exploſion, is joyned to them. For it is not poſſible, that the immenſe loſs of Spirits which happens in hard labours (if they were wholly deſtroyed) in ſo ſhort a time, ſhould be able to be reſtored by ſupplements coming only through the Nerves. We ſhall diſcourſe more largely of theſe things, if at any time hereafter we ſhall treat of the Motions of the Muſcles.

The animal Spirits being diſpoſed within the ſeveral Muſcles, according to the ſeries of Fibres, ſeem as it were ſo many diſtinct Troops or Companies of Souldiers; all which being ſet as it were in a Watch-tower, are ordained, as a new impreſſion is carried to them by the Nerves, either from the objects outwardly, or more inwardly from the Head, forthwith into various forms and peculiar orders for the performing of motion or ſenſe of this or that kind. The carriage or behaviour of theſe is worth the ſeeing in an animal newly killed and its skin taken off. For when life periſhes, and all the force of the Spirits flowing in through the Nerves hath quite ceaſed; yet the Spirits implanted into the whole Body breaking forth from the Muſcles, ſtill move and ſhake them, and force them into ſeveral Convulſions and trembling motions.

From what hath been ſaid we may gather, what the diſpoſition or order of the

animal Spirits may be in the whole animal Body: to wit, thoſe procreated in the cortical ſubſtance both of the Brain and Cerebel, are congregated into the middles of either, as it were into diſtinct Empories or Marts; and an expanſion being made in either, they cauſe certain interior powers of the ſenſitive Soul to be exerciſed; yet the ſame Spirits, affecting more room, enter the oblong Marrow (as it were the Cheſt, as hath been ſaid, of a muſical Organ) and fill it full; within which flowing, they carry to and fro the impreſſions of ſenſible Things and the Inſtincts of Motions. From the oblong and ſpinal Marrow the ſame Spirits, unleſs when they are otherwiſe buſied, tending outwardly, flow towards the ſeveral parts of the whole Body; which notwithſtanding wandring ſo out of doors, becauſe they paſs through very ſtrait ways in their paſſage, to wit, the ſlender bodies of the Nerves, they break not forth in heaps, or in a thick troop, but only contracted orderly, and as it were by bands or diviſions: but they being carried beyond the extremities of the Nerves, and there poſſeſſing the Membranes, Muſcles, and other ſenſible parts, dilate themſelves as it were into a moſt ample field, and with a very diffuſe Army they dwell in the Pores and paſſages of the Fibres planted every where about; where alſo being endowed from the blood with new food, they become more lively and more expeditious or ready for the deſigned offices.

Here perhaps it may be demanded, how the animal Spirits, diffuſed in ſuch numerous troops through the habit of the Body, are able to be ſupplied by ſo ſtrait chanels of the Nerves? To which we reply, That thoſe which reſide more outwardly do not quickly evaporate, nor are remanded back by Circulation: wherefore when all the Fibres are filled by an influx of the Spirits made by little and little from the beginning, very ſmall ſupplements ſuffice to repair their expence: For neither are thoſe dwelling more outwardly, for that they are repaired by the bloody food, much conſumed, though in frequent action.

Hence may be noted the difference between the diſtributions of the blood and animal Spirits. That Latex, becauſe it is reduced in a circle, its Veſſels are in the whole paſſage proportionated as to the bulk of the Trunk and the branchings ſent from it, to wit, ſo that the branches of the great Artery, being carried from the Heart, contain at the leaſt ſo much of the blood, as the ſhoots reaching forth from them, into all the parts. But becauſe the animal Spirits, being once begotten and carried more outwardly, ſubſiſt longer there, and evaporate very ſlowly and by little and little; therefore the Veſſels carrying them, *viz.* the Nerves, in reſpect of the Fibres receiving them, are made much leſſer in proportion; leſt perhaps by too great a ſupplement of the animal Spirits, and the too thick gathering of the freſh ones ſtill into the nervous parts, the Army of the Veterans, before inſtructed, ſhould be confounded, and ſo the orders of all being diſturbed, the exerciſes of the animal Function ſhould be performed any how. For indeed when at any time the Spirits are made too ſharp, ſo that being therefore ſtruck as it were with madneſs, they ruſh upon the nervous Syſtem with tumult and impetuoſity; from thence a great unquietneſs and continual throwing about of the Members are wont to be excited, to which ſometimes madneſs and fury ſucceed.

In the order and ordination of the animal Spirits, ſuch as was but now deſcribed, the *Hypoſtaſis* or the Eſſence of the ſenſitive Soul conſiſts, to wit, which is only a certain *Syſtaſis* or ſhadowy ſubſiſtence of thoſe Spirits, which like Atoms or ſubtil Particles, being chained and adhering mutually one to another, are figured together in a certain Species. Moreover, the faculties of the ſame Soul depend upon the various *Metatheſis* and geſticulation of thoſe Spirits within the aforeſaid Organs of the Head and nervous Syſtem. But the conſideration of this Soul and its powers requires a peculiar Tract, which hereafter (God willing) we intend; in the mean time, our Method demands of us, that (according to our weak skill) by the cenſe or numbering of the Nerves, being particularly made, we ſhould deliver an exact Neurology or Doctrine of the Nerves.

But for that in the premiſed general conſideration of the Nerves and Fibres, there was mention made of the nervous and nutritious Juyce; notwithſtanding what belongs to their powers and natures, hath been neither fully nor clearly enough delivered; therefore we will a little divert here, and make it our buſineſs to inquire what ſort of Juyces and Humors are carried into the parts of the animated body for their nouriſhment, and by what ways or paſſages: then this difficulty being removed, a plain and eaſie way leads into the Doctrine of the Nerves.

CHAP.

CHAP. XX.

Of the Nervous Liquor, and whether that or the bloody Humor be Nutritious.

SInce the Circulation of the Blood was made known, and it hath been plainly made appear, that it did no where ſtagnate and ſtand ſtill long, but was carried in a reciprocal motion, always as in a circle; it began to grow doubtful, whether its *Latex* is nutritious or not. For beſides, that the more rapid courſe of the blood, as of a torrent, might ſeem to wear the banks which it flowed between, and to carry away ſome Particles from them, rather than to be able to affix any thing to them; the ſubſtance it ſelf alſo of the blood, for that it is more torrid and uneven, is thought to be altogether unfit for nutrition. Wherefore that a Juyce may be found more convenient or fit for this office, the paſſages and hidden receſſes of the Nerves are to be viewed; and as a certain Latex is found to flow within their Pores and paſſages, preſently the blood being rejected, that nervous humor is gifted with the title of nutritious: but yet by what right, and after what manner nutrition is performed, ſhall be our preſent purpoſe to inquire.

And here firſt of all, that we may take the part of the blood, it will be eaſie to ſhew, that there is matter contained in it fit enough for the nouriſhment of the body, and a ſufficient ſtore of it. For beſides the ſulphureous ſubſtance of the blood, which within the fire-place of the Heart, with a continual inkindling, and by that means deflagration in the Veſſels produces life, and in the more perfect Animals heat, there is found alſo a certain other humor ſoft and alible, which in the Circulation, being diſtributed through ſeveral parts of the Body, by increaſing them adds nouriſhment and bulk: yea the deflagration it ſelf of the blood, plainly as a Kitchin-fire in dreſſing meat, as it were boils and prepares this humor, whereby it more eaſily is aſſimilated into the ſubſtance of every part to be nouriſhed. Hence it comes to paſs, that by reaſon of a defect of heat in the blood, no leſs than of exceſs, nutrition is often hindered. But that this kind of alible Juyce is contained in the bloody maſs, the *Anatomy* or ſpontaneous *Analyſis* of its *Latex* ſufficiently declares; for the extravaſated blood, when it goes into parts of its own accord, this liquor being disjoyned from the purple thick part, and ſwimming a-top of it, appears clear or limpid; but by reaſon of its more thick contents, to wit, the nutritious Particles, like the white of an Egg, it is eaſily made thick, and grows white by a gentle heat: which thing appears by this familiar Experiment, to wit, if you ſhall evaporate a little of it only in a Skillet over the fire, the whole liquor will preſently grow together into a white Gelly. By this liquor, as the blood is more or leſs imbued with it, living Creatures grow and become more fleſhy or lean: for both the blood of younger Animals being looſned from cold, is wont to ſhew much more of this kind of white than more ancient or older Creatures; and we may take notice daily at our Tables, that very much of this kind of Gelly comes out of the fleſh of a Lamb or Calf being boiled or roaſted, and nothing almoſt from Mutton or Beef, eſpecially if old. Therefore we may lawfully ſuppoſe, that the blood is truly nouriſhable; and that the whole, or at leaſt the greateſt part of the matter, for the adding bulk or ſubſtance to every part, is diſpenſed from it: but if at any time it be defective in this its office, that happens not out of the natural unfitneſs of it, but becauſe its diſpoſition is ſometimes depraved, and as the Stomach labouring with ſome vice, rejects or perverts the Chyle to be cooked by it.

But the blood, as it is not the only and alone humor, which is diſtributed in the animated Body, ſo neither ſeems it able to perform alone and of it ſelf the whole office of nutrition. For beſides that, being diffuſed through the Arteries and Veins, another Latex is every where diſpenſed from the Head through the Nerves; which ſhall be ſhewn to afford ſomething at leaſt to nouriſhment.

As to the firſt, there are many reaſons which declare that kind of humor to be in the Brain and nervous ſtock, and to abound in their whole paſſages. For unleſs the animal Spirits, continually flowing out, ſhould be founded in ſuch a Latex, which is their Vehicle, they would not be contiguous or joyned, nor able to continue and knit

knit together the *Syſtaſis* of the ſenſitive Soul. For if *Hippocrates* did obſerve long ſince, that Cramps and Convulſive motions were produced from drineſs and emptineſs, that perhaps might happen by this means: to wit, becauſe the humor in the Nerves or Fibres being deficient, the Spirits diſtracted one from another, were ſeparated; which notwithſtanding, that they might ſtill retain their mutual embraces, and as it were folding of hands, bend the containing bodies, and very much contract, and ſo force them into Convulſions. Beſides, Wounds and Impoſtumes of the Tendons and nervous parts ſeem to witneſs the diffuſion of the nervous Juyce, either of which drop forth a thin Ichor, and wholly unlike to the mere bloody Excretion: no leſs may be argued from the Ganglia and Evil running Sores. In time of ſleeping the aforeſaid humor is wont to flow more plentifully into the Brain and Nerves, and to obſtruct their paſſages; and therefore yawnings and ſtretchings come frequently upon thoſe awaking, that its reliques might be ſhook off. Laſtly, we might readily ſhew, that from the depravation of the nervous humor, Melancholy, Madneſs, and ſome wonderful Convulſive diſtempers proceed. But it may be objected, that there is no ſuch kind of humor, becauſe the Nerves being cut aſunder, it is not perceived to flow out; and that the Nerves being alſo bound, they do not ſwell above the Ligature, as Arteries and Veins. But it may be anſwered, That the liquor flowing in the nervous ſtock, is very ſubtil and ſpirituous, and which, by any ſtriving or wrinkling up of thoſe parts, when they are roughly handled, may eaſily evaporate and be blown away or diſperſed unperceivably. Then further, 'tis obſerved in the Whelps of ſome Animals newly litter'd, who have as yet that juyce viſcous, and not eaſily to be diſperſed, and that have their Nerves greater, if they be bound hard together with cords, they will ſwell above the Ligature.

Therefore ſeeing it appears, that a certain Humor doth creep through the blind Pipes and paſſages of the Head and of the Appendix, both medullar and nervous, it behoves us next of all to inquire from whence that comes thither, and whither it tends; and laſtly, of what kind of nature and uſe it is. Concerning theſe firſt it appears, from what hath been ſaid, that the aforeſaid Latex, ſerving for a Vehicle of the animal Spirits, is perpetually inſtilled, together with them, from the blood watering the exterior confines of the Brain and Cerebel, which from thence, paſſing through the medullar Trunk, is afterwards, with a gentle ſpring, poured through the whole frame of the nervous Syſtem; ſo that the firſt fountains of the nervous humor are in the Brain and Cerebel. But further, to this Juyce conveying the forces of the animal Spirits, and ſupplied only from the Head, there joyns a certain other humor, as it were auxiliar in the whole paſſage, and reſtores and refreſhes it otherwiſe about to grow deficient.

We think that theſe kind of ſupplements and ſubſidies, which happen to come from elſewhere to the nervous Juyce flowing from the Head, are received and admitted inwardly from the ſides and extremities of the medullar and nervous Syſtem. We have already ſhewed that an humor, as it were ſecondary, is inſtilled from the blood watering theſe parts in its whole paſſage; becauſe the Arteries follow not only the medullar Trunk, but alſo the greater Trunks of the Nerves in many places, and inſert into them ſanguiferous ſhoots. Beſides, foraſmuch as the animal Spirits flowing within the nervous ſtock for the performing of ſenſe and motion, tend to and fro, and ſo bear a double aſpect; it is probable alſo, that the liquor watering the Nerves, as it moſt commonly tends forward, ſo ſometimes backward; and ſo that the extremities of the Nerves, implanted in ſome parts, imbibe from them the humor, at leaſt ſome Effluvia's, with which they are ſatisfied, and oftentimes transfer them into the Brain it ſelf. Certainly there is no doubt, that the Fibres and nervous Filaments or threads which cover the Senſory of taſte, and the *Viſcera* ſerving for Concoction, do immediately receive ſome taſtes of the taken in food, from which ſupplies are carried to the Brain it ſelf in great hunger and faintneſs of Spirits. Becauſe if at any time the Spirits inhabiting it, being exhauſted very much with heavy and long labour, begin to fail, a moſt ſwift refection is performed, Pectorals or Cordials being ſcarcely ſwallowed, and long indeed before the alible Juyce can be able to reach to the border of the Brain by the paſſage of the blood. Moreover it is moſt likely, that not only the benign Effluvia's of the aliment are received by the extremities of the Nerves ending about the *Viſcera*; but alſo by this way, that oftentimes an infeſtous matter, and in a manner malignant, is communicated by the Nerves and their paſſages to the Head. But indeed the preternatural Juyces heaped up about the

the Hypochondria, the Spleen, Womb, and other Bowels emit vaporous little bodies, which not only infect the bloody maſs, and diſtemper the Head by that means, but they climb to the Brain more immediately by the paſſage of the Nerves, and ſtrike it with an heavy ill. For from hence in part it comes, that Hypochondriacks and Hyſterical people are ſo cruelly puniſhed through the Symptoms ſtirred up in the Brain and nervous ſtock for the faults of the lower Bowels; hence it is, that little Pills of Opium, being ſcarcely diſſolved in the Stomach, cauſe a Torpor or heavineſs. But here is no place to diſcourſe more largely of theſe. It behoves us to conſider what remains, the Springs of the nervous Juyce, the Auxiliaries but now detected, and its Virtues and Influences.

Concerning the nervous Liquor we ſhall inquire what that doth in its paſſage, to wit, whilſt it flows within the Marrows or middles of the Brain and Cerebel, the medullar Trunk and the bodies themſelves of the Nerves: ſecondly, then for what uſes it ſerves, when being ſliden from the ends of the Nerves, it is ſpread abroad on the ſecondary parts of the nervous Syſtem.

1. As to the firſt, whilſt that of the nervous Liquor paſſes through the Head, and either of its Appendix, its chief office ſeems to be for a Vehicle of the animal Spirits, which indeed it carries along with its diffuſion, and contains them under the ſame *Syſtaſis*. Yea, this Latex ſhews various Schemes of the Spirits for the performing of ſenſe and motion; even as the humid Particles of the Air paſs through the Optick Configurations of the Rays of Light. Alſo moreover, the nutrition of the aforeſaid parts and accretion or growth into a greater bulk, depends in ſome meaſure upon the nervous Juyce watering the ſame, as ſhall be ſhewed by and by.

2. But the greateſt queſtion is concerning this Liquor being diffuſed beyond the ends of the Nerves upon the ſecondary parts of the nervous Syſtem, and in the paſſages of them on the whole Body; to wit, whether ſuch a Juyce be nouriſhing of all the ſolid parts, or of ſome of them by themſelves, as Authors variouſly think; or to what other office it is deſtinated.

Concerning theſe it firſt appears, that the Brain and Nerves, with the Juyce flowing out of them, contribute matter, or at leaſt ſome influence to the work of nutrition; the which if it ſhould chance to fail (a ſign of which defect is, if the animal Faculty falters in part) the nouriſhment there is wont preſently to be hindred or perverted. This is plainly ſeen in the Palſie, excited from an evident cauſe, without any previous Dyſcraſie of the blood, where ſuddenly an Atrophy follows the privation of motion or ſenſe, or of both together. Further, in the Scurvy, where the taint hath corrupted the nervous Juyce, when the ſick begin to be afflicted with the Vertigo and ſwimming of the Head, and with wandring pains, Convulſions, and a frequent looſning of the Members, the fleſh falls preſently away, as in a Conſumption, and without any fault of the Lungs, the ſick wither away, as if diſtempered with a Phthiſis. It is a vulgar obſervation, That from the immoderate uſe of *Venus*, alſo from an inveterate Gonorrhœa, from Strumous or running Ulcers, and other Impoſtumes, by which much of the nervous Juyce is waſted, a leanneſs or waſting of the whole Body is produced. Certainly, if I be not deceived, there are ſome Atrophies, yea, and ſorts of breakings out, which ſeem to depend wholly upon the defect or the evil diſpenſation of the nervous Juyce, when the blood, as to its quantity and diſpoſition, is not much in fault. Laſtly, the conſideration of ſome Diſeaſes and Symptoms ſo plainly confirms the diffuſion of the nervous Liquor and its great influence on all the parts, that there is even left no room for doubting.

Alſo no leſs doth the curing of ſome Diſeaſes and the uſe of Remedies confirm the ſame. For from hence a reaſon is taken, wherefore Cephalick Plaſters oftentimes yield ſuch ſignal help in the *Phthiſis*; not becauſe they ſtay the *Catarrh* of the Serum falling down on the Lungs, (as the common people think) but becauſe by corroborating the Brain they reſtore the diſpoſition of the nervous Juyce, before vitiated. For this cauſe it is, that ſome diſeaſes being ſtirred up by the fault of the nervous Liquor, of which ſort among others are Cancrous and Strumous Ulcers, or ſuch as come of the Kings-Evil, are hardeſt of all to be cured; becauſe the morbid tincture of the Brain, and of the *Latex* watering it (whether it be innate or acquired) is not eaſily mended: yet ſometimes when the root of the diſeaſe, lurking in the Brain or nervous ſtock, is taken away by the help of Nature it ſelf, or by Chance, by the uſe of ſome remedy; preſently the Symptoms of other parts, though neglected in the whole, vaniſh, not without the ſuſpicion of a miracle. But how much the alteration of the Brain ſerves for

for the curing of ſome moſt grievous diſeaſes, ſome inſtances taken from the Farriers Art will clearly ſhew.

For when many Medicines and Methods of Adminiſtrations are wont to be tryed in vain for the curing the ſtinking diſeaſe in Horſes, commonly called the *Farcy* (which *Helmontius* aſſerts to be like the French Pox, and the Author of its Contagion) the moſt certain means of curing (which I have very often known to be applied with good ſucceſs) conſiſts in this; that ſome ſharp Medicines, of which ſort are Hearts-eaſe, Water-Pepper, Ranunculus or Crowfoot, and the like, which very much abound in volatile Salt, being bruiſed into a maſs, and put into the Ears of the diſeaſed Horſe, and kept there for twenty four hours: it is ſcarce credible by what means all the Ulcers are preſently dryed up, and the diſeaſe healed, as it were by Inchantment, is quickly profligated in the whole. For ſince this Application is made far from the affected parts, without any alteration of the bowels or the blood, it ſhould be ſo healed at a diſtance; certainly the cauſe of ſuch an Energy muſt only be, that by this kind of Medicine the Dyſcraſie or evil diſpoſition of the Brain and nervous Juyce is taken away, and ſo the firſt root of the ſickneſs being cut off, the ſhoots and fruits preſently wither. It were worth our labour to try ſuch kind of Experiments alſo in our Medicines. Yea it may be well ſuſpected, that ſuch a way ought to be ordered for the common Cure of the Kings-Evil. Among our Country-men, as delivered from our Anceſtors, it is thought that the ſeventh Son, or he that is born the ſeventh one after another in a continued ſeries, can cure this diſeaſe by ſtroking it only with his hand; and truly I have known many, whom no Medicines could help, to have been cured in a ſhort time only by that remedy. Few doubt but that this diſeaſe is wont to be cured often by the Touch of our King. The reaſon of ſuch an effect (if it be merely natural) ought to be aſſigned not to any other thing than that in the ſick (eſpecially thoſe of ripe age) the Phantaſie and ſtrong Faith of the hoped for Cure induces that alteration, or rather ſtrengthning to the Brain, whereby the morbid diſpoſition radicated in it is profligated. But I ſhall return from whence I am digreſſed, to inquire what the nervous Juyce contributes to nutrition.

2. I ſay therefore ſecondly, although nutrition depends in ſome meaſure upon the influence of the nervous Juyce, yet it is highly improbable, that all the ſeveral parts of the whole Body ſhould be nouriſhed only by this proviſion. For beſides that this were to impoſe upon the Government of the Soul it ſelf, and its primary Organs, the cooking office of nutrition wholly unworthy the excellency and dignity of thoſe parts; it ſeems alſo that the nervous Liquor ſhould be altogether unfit for the adminiſtring to this Province: becauſe when oftentimes immenſe expences are made of the aliment to be aſſimilated into the ſubſtance of the ſolid parts, eſpecially by immoderate ſweat, alſo by continual labour and exerciſe, which Country-men and Labourers daily uſe, it is not poſſible that ſuch loſſes ſhould be repaired only by the nouriſhment ſupplied, or ſent through the ſmall paſſages of the Nerves.

When I had long and ſeriouſly conſidered with my ſelf concerning this thing, what I at length thought, I ſhall tell you freely, and without any covering, or making any reflection, or blaming the Opinions of others. It ſeems firſt, that the nouriſhing matter of the whole Body is diſtributed into all parts from the blood through the Arteries; yet it may lawfully be thought, that the converſion of this matter into nutriment, and the aſſimilation of it into the ſubſtance of the part to be nouriſhed, is performed by the influence and help of the nervous Juyce, as it were of a certain ſpirituous Ferment. As to the firſt: we have already noted, that the ſanguiferous Veſſels do not only follow almoſt every where the Muſcles and Bowels, but alſo the Head and its Appendix, yea the Membranes, Bones, and Nerves themſelves, and affix to them all thick ſhoots, as ſo many little chanels, for the receiving the nouriſhment. Moreover, as there is a purple craſſament or thick ſubſtance in the blood, whoſe ſubſtance ſtuffs and nouriſhes the Pores of the Parenchyma of the Muſcles; ſo there is a whitiſh Gelly, by which the Membranes and the whiter parts ſeem to increaſe. Beſides it may be obſerved, that the blood it ſelf increaſing, contains in it ſelf fibres and ſmall threads, ſuch as are interwoven in the Muſcles and nervous parts; and if the ſame ſtand long in any Veſſel, it is preſently coagulated into longiſh, white, and hard cruſts or bits, whoſe ſubſtance is plainly fleſhy; ſo that the blood produces fleſh of it ſelf, though the ſame be rude and unformed: wherefore the configuration and the apt diſpoſition of the nouriſhing matter, ſupplied from it, depends on the coming and Energy of the nervous Juyce: but after what manner this is done, we ſhall endeavour now to ſhew.

After

After the web or ſtuff of all the parts is laid, it is required then that they be both drawn forth in dūe proportion, and grow in ſubſtance, and alſo that the little ſpaces which are left by reaſon of the Effluvia's perpetually falling off, may be continually filled with the nouriſhing ſubſtance caſt in. In theſe two things the buſineſs of nutrition chiefly conſiſts; for the performing of either of which the blood affords matter, and reaches it forth (as was ſaid) in the circulating to the ſeveral parts of the concrete, and as it were ſtands at the doors of the part to be nouriſhed: yet, that this matter may be rightly diſpoſed, and its particles, to wit, the thick and thin, ſaline and ſulphureous, and others of a ſeveral nature, ſeparated one from another, may be imployed with ſome choice to the deſtinated uſes, there ſeems need of a certain directing faculty, and as it were plaſtick virtue, got ſomewhere elſe than from the blood it ſelf. For indeed the blood being deſtitute of animal Spirits, is unfit for the performing theſe offices. Wherefore, for that it appears there doth lye hid in the nervous ſtock, a certain juyce, and the ſame being gifted with animal Spirit to be diffuſed to all parts, how can we ſuppoſe leſs but that this ſubtil and ſpirituous Liquor, every where meeting with the arterious, which is duller and thicker, actuates and inſpires it, and as it were ordains it for the performing the deſigned work of nutrition? eſpecially when it plainly appears, that by reaſon of the defect or depravation of this nervous Juyce, nutrition is always fruſtrated or perverted.

Therefore it may be lawful, in the difficult Controverſie concerning the Matter and Method of Cure, to propoſe this our Hypotheſis, though it be a Paradox and very abſtruſe; to wit, that the nervous Juyce (which we have ſaid was like the male ſeed) is poured out with the nutritious humor copiouſly ſuggeſted from the Arteries, as it were the genitive or ſeed of another Sex, every where upon all the parts; and that this former, being indued with active Elements, imbues the more thick matter, as with a certain Ferment, and impregnates it with animal Spirit; and when it ſo makes it, with a mutual entring in or coming together, to be diſſolved and to go into parts, its particles being extricated one from the other (the Spirit infuſed helping) they are put upon bodies of the ſame meaſure with themſelves, and are aſſimilated into their ſubſtances. In the mean time, becauſe the animal Spirits are poured out in great plenty with the nervous Juyce, thoſe which are at leiſure from the work of nutrition, or remain after that is finiſhed, turn aſide every where into the Fibres, as into proper dwelling-houſes, and there being ready for the offices of ſenſe and motion, ſtay; which offices indeed, that thoſe Spirits the Inhabitants of the Fibres, may the better perform, they acquire from the blood watering the Muſcles, certain auxiliary forces, wherefore they being endued with a certain elaſtick force, are apt to be highly rarified and as it were exploded.

But indeed we ſuppoſe, that as the nervous Liquor, being turgid with animal Spirit, cauſes the arterious humor to become nutritious; ſo in compenſation of this the animal Spirits remaining of the work of nutrition, and every where diſpoſed within the Fibres, receive from the arterious blood a mixture or certain Copula; by whoſe help and cooperation the ſame Spirits exert or put forth much more ſtrongly their locomotive force. For it ſeems that little ſulphureous bodies are added to the ſpirituous-ſaline particles from the watering blood; and ſo when the animal Spirits are furniſhed with this Copula, they being ſtirred up into motion, ſhake off the borrowed particles, which being ſtruck with a certain force, like the exploſion of Gun-powder, ſuddenly intumifie the Muſcles, and ſo by contracting them very much, they cauſe a vehement motive endeavour. We ſhall have an occaſion of diſcourſing more at large of this, when we treat of the Motion of the Muſcles.

Yet in the mean time, we ſhall take notice, that the Muſcles of the whole Body, as to their motion, have a certain Analogy with the motion of the Heart. For indeed the animal Spirits in the Heart, flowing within the fibres and nervous threads, (with which this part is much beſet) receive plentifully ſulphureous little bodies from the inflowing blood diſtending the ſides of either boſom, which whilſt the ſame Spirits, being filled to a fulneſs, ſhake off and as it were explode, a *Syſtole* of the whole Heart (its ſides being carried with a certain force inwards) is brought in or cauſed, whereby the blood, from either ſide the boſom, is caſt out as it were by the impulſe of a Spring or Bolt. Truly, unleſs the Spirits inhabiting the Heart, ſhould receive food and matter of exploſion from the blood it ſelf, their ſtock, ſupplied or ſent by the paſſage of the few and ſmall Nerves, would not ſuffice for the performing of the undiſcontinued motion. A ſign of this is, that from a defect or depravation of the blood,

as well as of the animal Spirits, the motion alſo of the Heart is defective or diminiſhed. And not much unlike in the Muſcles, as in the Heart, is the buſineſs performed; the Spirits inhabiting their Fibres, receive a ſulphureous Copula and apt for exploſion, from the blood there more plentifully flowing than about the Membranes, with which being endued, as often as they receive from the Nerve as it were the fiery inkindling or the match, the inſtinct of the motion to be performed, they being excited, and ſtriking of their Copula, very much inflate or blow up the Muſcle, and intumifie it for performing or compaſſing the motive endeavour. Nor is it much to purpoſe, or makes any great difference, that the motion of the Heart, ſtirred up by a perpetual inſtinct, is found always neceſſary; but the Muſcles the moſt of them only occaſionally and at the command of the Animal, do put forth their motive power; for the *Diaphragma* and ſome Muſcles, dedicated to Reſpiration, are urged with a perpetual *Syſtole* and *Diaſtole*, as well as the Heart it ſelf.

From the aforeſaid Hypotheſis concerning the offices and uſes of the nervous and arterious Juyce, Arguments that otherwiſe determine the work of Nutrition, may be eaſily anſwered. For that the blood is ſaid rather to prey upon the ſolid parts than to repleniſh them, that ought to be attributed to the Diſeaſe and Dyſcraſie of it, and not to it ſimply: becauſe ſometimes the blood is accuſed, for that it too much ſtuffs the ſolid parts; to wit, foraſmuch as its maſs being wateriſh and weak, it lays aſide the alible Juyce (which not being truly cook'd, is ſtill crude and vicious) with very great plenty about the habit of the Body, and ſo induces an *Anaſarca*. In the mean time it ought to be granted, That as it is the blood that is evil which heaps up too much vicious nutriment; ſo it is the ſame, which being well and right, doth laudably perform the office of Nutrition.

But that it is argued, That the nervous is rather the nouriſhing Juyce, becauſe by reaſon of its defect, depravation or too prodigal expence, the acts of nutrition are wont to be hindred or perverted; it is eaſie to reply to this, That the impediments of the nervous Juyce, being made vicious, reſpect the form of nouriſhment, and not the matter of it: to wit, it ſometimes happens, that the blood diſpenſes the alible matter in due plenty and diſpoſition; which notwithſtanding, by the fault of the nervous Juyce, is not rightly aſſimilated. When an impotency of motion comes upon a too great diſtenſion of the Muſcle or Tendon with pain, ſhortly nutrition being hindred, a Jelly grows about the diſtempered part: which notwithſtanding drops not out of the Nerve (as is commonly ſaid) but the glutinous humor being poured out of the Arteries for aliment, for that it cannot be received by the hurt part, is gathered together there: nor is it to be thought, that Tumors, or Strumous Ulcers or the running Sores of the Evil do contain or pour out only a nervous humor, ſince the matter of either is for the moſt part bloody, which by reaſon of the evil Ferment of the nervous Juyce, puts on a ſtrange form, and that diverſly degenerous.

This ſuppoſition of the twofold Humor, for the matter and form of nouriſhment, is taken to be of egregious uſe for the ſolving of the moſt difficult Phænomena, which are met with about the Diſtempers of the Brain and nervous Juyce: yea, that Pathology, ſeriouſly conſidered, ſeems to infer as a certain neceſſary conſequence, that a twofold Juyce is neceſſary for the work of Nutrition; as ſome other time perhaps we may ſhew. In the mean time, leaving this Speculation, we ſhall proceed to the remaining Task of our *Anatomy*, to wit, the *Neurologie* or of the Nerves in particular.

THE

THE Description and Use OF THE NERVES.

CHAP. XXI.

The first four Pair of Nerves arising within the Skull are described.

THE division or distinction of the Nerves, by reason of their various respects, is wont to be manifold: to wit, as they are either soft or hard, singular or numerous in their beginnings; or that they serve either to the faculty of Sense, or Motion, or to both together. But they are commonly distinguished, That some Nerves arising within the Skull, proceed from the oblong Marrow; and others going out of the joynts of the *Vertebræ*, are derived from the spinal Marrow. But besides these, another manner of differencing them seems best to us; to wit, That some Nerves, as it were Clients and Servants of the Brain, perform only spontaneous Acts, and others, Ministers and Servants of the Cerebel, are imployed only about the exercises of the involuntary Function. There will be no need to assign different Essences or Constitutions of Nerves according to these several differences: but rather that there be instituted a particular Cense or Muster of them, and following the order of Nature, that we especially unfold every one of them in the series in which they are disposed in the animal Body.

Among the Nerves arising from the Skull, the smelling Nerves, or those which are commonly called the Mammillary Processes, lead the way; for that they have their rise before all the rest, and are stretched out forward beyond the Brain it self. These Nerves go out of the shanks of the oblong Marrow within the chamfered bodies and chambers of the Optick Nerves; and being endued with a manifest cavity, open into the first Ventricle of the Brain on either side behind the same chamfered bodies; so that the humidity flowing between the folding of the Brain, is carried through these chanels into the mammillary Processes; whether they go farther forward, shall be anon inquired into: Because these Nerves being broad and large, arising near the chamfered bodies, and from thence stretched forward under the Basis of the Brain, their bulk is increased by degrees till they go into the round Processes like Paps, by which either bosom of the Cribrous or Sieve-like Bone is besmeared. Within the Socket of this Bone these Nerves, as yet soft and tender, obtain Coats of the *Dura Mater*; with which being divided into many fibres and filaments, and passing through the holes of the Sieve-like Bone, they go out of the Skull: from whence being dilated or carried forward into the caverns of the Nostrils, and distributed on every side, they are inserted into the Membrane bespreading those Labyrinths.

If we inquire into the nature and use of these parts, without doubt the mammillary

Proceſſes and their medullar roots, with the fibres and ſmall threads hanging to the ſame, are truly Nerves, and ſerve properly for the very Organ of the Smell. Seeing theſe conduce to the ſenſe only without any local motion, therefore (even as the other hearing Nerve) whilſt they are within the Skull, they are plainly medullar and ſoft; whereby the animal Spirits more eaſily moved within the more tender ſubſtance of the Nerves, might convey more readily and accurately to the common Senſory the Ideas or forms of the ſenſible Species: But becauſe the effluvia's or odorous breaths to be received by the naked Organ, carry oftentimes with them ſharp and pricking Particles hurtful to the Brain and Nerves; therefore in the firſt courſe theſe Nerves being about to go out of the Skull, borrow Coats from the *Dura Mater*, which ſerve for Armour. Further, as theſe breaths (leſt they ſhould ſtrike more ſharply by ruſhing impetuouſly on the Senſory) being admitted only by little and little, and by ſmall bands, ought to be brought through divers narrow turnings and windings of the Noſtrils; therefore that theſe Nerves may the better receive the effluvia's flowing within the ſeveral dens, they are ſo divided into very many fibres and ſmall threads or filaments, that there may be no paſſage of the Noſtrils to which at leaſt ſome of them are not deſtinated. And after this manner, although the exhalations, as it were torn into little Clouds, are received by the nervous filaments, and ſo care is ſufficiently taken, that they being more thickly elevated, may not overwhelm or obſcure the Senſory; yet leſt any thing ſharp and troubleſom ſhould be carried with them to the Brain, the cribrous bone is ſet before the doors as an obſtacle, through whoſe little holes being ſtrained, they may put off all ſharpneſs. And laſtly, they being carried through the ſofter Nerve, as it were another Medium, and ſo broken again, they at length being ſoft and gentle enough, are ſtaid at the firſt Senſory.

But that theſe Nerves are noted through the whole with an open hollowneſs within the Skull, the reaſon ſeems to be, that the watry humor ſtilling out of the foldings of the Brain, and being derived into thoſe chanels, might beat back and temper the impreſſions of the odours, when too ſharp and fiery: for as the humors included in the Eye, variouſly refract the viſible Species, whereby it paſſing at laſt through the Optick Nerve without any force, ſlides pleaſantly to the common Senſory; ſo it is not improbable, that the water contained within theſe paſſages of the Nerves, does in like manner ſweeten the ſpecies of the odours, and prepare them in ſome meaſure for the Senſory. Wherefore it is obſerved, that Cattle and Beaſts which are fed with herbage, have the mammillary Proceſſes exceeding large and always full of water; to wit, leſt the odours of the herbs continually attracted by them (unleſs their force ſhould be blunted after the aforeſaid manner) might hurt or overthrow their more weak brain. Beſides, it is very likely that this watry juyce falling down from the infolding of the Brain, doth not only flow into the open chanels of the Nerves and the mammillary Proceſſes, but alſo doth paſs through by the paſſage of the fibres and filaments the holes of the Sieve-like Bone, and doth wet and continually moiſten the cavities of the Noſtrils, apt to be dryed or torrified too much by the Air thither attracted, and by the breath continually blown out. For it clearly appears, as we have elſewhere ſhewn, that the ſerous humors creep through the blind paſſages of the Nerves and Fibres, and by them wander from place to place. Yea it may be thought, that not only water, ſufficient for the watering the Noſtrils, doth by this way ſweat through; but alſo whenſoever the ſerous heap is gathered together in the Ventricles of the Brain, its ſuperfluities or the excrementitious humor doth very often paſs through the cribrous Bone by the paſſage of the Fibres, and is ſent out. But we have in another place diſcourſed more largely of this.

The ſmelling Nerves, which have within the Skull their mammillary Proceſſes depending on them, are much greater in an Ox, Goat, and in Cattle, and ſuch like beaſts that live on herbage, than in fleſh-eating Animals; to wit, becauſe in thoſe there ſeems to be more need of the ſenſe of ſmelling to be more exquiſite for the knowing the virtues of the manifold herbs. Alſo theſe Nerves are larger in all Brutes than in Man: the reaſon of which is, becauſe they diſcern things only by the ſenſe, and eſpecially their food by the ſmell; but Man learns many things by education or nurture and diſcourſe, and is rather led by the taſte and ſight, than by the ſmell in chuſing his aliments. Theſe Nerves in Birds, as alſo in Fiſhes, are conſpicuous enough; for either of theſe, even as four-footed beaſts, ſeek out and chuſe their food by the help or knowledge of the ſmell.

As to the Fibres and Filaments or little ſtrings ſtretching out from the more ſoft Nerves

Nerves through the holes of the Sieve-like Bone into the caverns of the Nose, these are found in all Creatures who have the mammillary Processes: sothat it is not to be doubted, but that these Processes, with this Appendix and its medullary origine, is the Organ of the Smell. And what more confirms this thing, these filaments or little strings are far more, and more remarkable in hunting Hounds than in any other Animal whatsoever. But besides these Nervulets drawn through the holes of the Sieve-like Bone into the Nostrils, two branches also are sent hither from the fifth pair, and distributed into both the Nostrils. The reason of this seems to be, because though the Nerves but now described, or of the first Conjugation, are properly smelling Nerves, and effect by themselves the sense of Smelling; yet these are assisted or joyned with other Nerves, also by those sent from the fifth pair, because the Organ of the Smell ought to have a consent with all other parts, which those subsidiary Nerves, by reason of the manifold branching out of the fifth pair, are wont to perform. It chiefly appears, that there is a certain nearness or strict affinity between the taste and the smell: and the cause of this consists, in that out of the same Trunk of the fifth pair certain Nerves are sent to the Palate, and others to the Nostrils. Concerning the reason of that wonderful consent which the Nostrils have with the *Præcordia* in sneezing, also wherefore that light titillation stirs up a Cough, shall be spoken of hereafter, when we come to unfold the fifth pair and the intercostal Nerves. But in the mean time we shall take notice, that although many Nerves belong to the Organ of Smelling, yet that sense is properly performed by the Fibres interwoven in the inward Coat of the Nostrils: for those Fibres being struck by the sensible object, move and contract themselves variously according to the Idea of the impression; which Affection of them being carried by the passage of the Nerves to the Head, forasmuch as it is there staid by the common Sensory, causes the perception of the sense. Those sensible Fibres are diversly figured in several Animals; which is the reason, why odorous things do not alike affect all Animals. For what things by a mans nostrils, as endued with too sharp and pricking Effluvia's, are esteemed highly naught and stinking, as especially are dung and putrid flesh; the same are to Dogs, whose Organ of Smelling is made or consists of more robust or strong Fibres, and proportionate to those Effluvia's, as very grateful and chosen for food.

The second Conjugation are the Optick or seeing Nerves: concerning which we have shewn already, in the Anatomy of the Brain, after what manner they arise from behind the chamfered bodies out of the second section of the medullar shanks (which *Galen* calls the *Chamber* of the Optick Nerve) and descending from thence with a certain compass are united, and being again separated and carried into the Ball of the Eyes, constitute with diffused Fibres the hard Coat. Moreover, in those Observations we did but now take notice, that the Trunk of this Nerve growing a little hard without the Skull, was as it were a little bundle of very many Fibres or small strings growing together into one, and of produced Parallels, as it should seem for that end, that the animal Spirits, flowing in the whole Nerve, might be moved in so many lines or direct rays; to wit, whereby they may carry the visible Species, sufficiently refracted in the Eye, thence to the common Sensory by a direct beam, and not intorted or rolled about.

As often as in the distempers of the Eyes blackish pricks or concatenated pieces of any thing seem to be rolled before the Eyes, it is likely that this apparition is so made, because certain filaments or small strings of the Optick Nerve are shut up, which when the light cannot pass through rightly, as through the rest, so many as it were shadowy spaces appear in the middle of the clearness. These Nerves, because they only serve for the sense, are therefore more soft within the Skull: but because there may be need perhaps, that the Trunk of this Nerve ought to be sometimes dilated or spread abroad, sometimes bound close together or contracted according to the divers appearance and incourse of the objects; therefore very many Fibres, being sent out from the motory or moving Nerves of the Eyes, do every where compass and bind it about, and entring with it into the Ball of the Eye, are inserted partly near the root of the Optick Nerve, and partly penetrate more deeply the Sclerotick or hard Coat it self.

Further, the Optick Nerves are not only bound or environed with nervous Fibres sent from the third pair, but (as we have shewn above) with sanguiferous Vessels in their whole process. The office of which certainly is, both that there might be every where about the greater Trunk of this Nerve as it were a continual heat or sufficient fire-

fire-place; alſo perhaps, that the food of the bloody humor might be ſupplied to the Spirits, living there within the trunks of the nerves, far from the fountain, as is wont to be in other places.

Concerning the Fabrick of the Eye it ſelf, and manner of ſeeing, alſo concerning the whole dioptrick proviſion, here ſeems a fit opportunity of diſcourſing: but this were to digreſs too far from our purpoſe, to wit, the mere or naked Doctrine of the Nerves; and I may the better paſs by this addition, becauſe this Province hath been ſufficiently and accurately adorned by others. In the mean time we ſhall take notice, that as in the ſmelling, ſo alſo in ſeeing, the ſenſe is performed, not ſo much by the help of the nerve, as of the fibres, which are interwoven with the organ: to wit, the little fibres in the Membranes of the Eyes, and eſpecially thoſe inſerted into the Sclerotick Coat; and diſpoſed after the manner of a net, do receive the impreſſion of the viſible Species, and by repreſenting the image of the thing, ſo as it is offered without, cauſes ſight. But it is the office of the nerve it ſelf to tranſmit inwardly, as it were by the paſſage of the Optick Pipe, that image or ſenſible Species, and to carry it to the common Senſory.

The third Conjugation of Nerves are the moving nerves of the Eyes, which ariſe in the Baſis of the medullar Stem behind the Tunnel; from whence going forwards nigh the pair of ſeeing nerves, and going out of the Skull with the other nerves deſtinated to the Eye, they are carried towards the Globe of the Eye; where, being preſently divided into many branches, they provide it with moving Muſcles; but with various difference in divers living Creatures. For in an Ox, who hath got a larger eye, the moving nerve of the eye imparts a branch to every one of the ſix common Muſcles, and beſides, from the nerves of the fourth, fifth, and ſixth pair certain branches are diſtributed to ſome of the ſame Muſcles: ſo that, as often as any Animal intends or applies the ſenſe for the perceiving of this or that object, theſe nerves turn about the Eye, and compoſe it at their pleaſure for the ſpontaneous beholding of the ſame. Beſides we take notice, that the Eyes do get a diverſe kind of involuntary motion; becauſe in Fear, Shame, Anger, Sadneſs, yea and in all Affections of the Head and Heart, whether we will or no, the Eyes are reſpectively figured. Wherefore 'tis highly probable, that theſe kind of pathetick motions of the Eyes, whereof the living Creature is ſcarce knowing, are performed by the help of the other nerves, to wit, of thoſe coming from the fourth, fifth, and ſixth pair: and that more manifeſtly appears, becauſe the ſame nerves which lend their branches to the Eye, take their origines from the Cerebel, the office of which we have often ſhewn to be, to diſpenſe the Spirits for the exerciſe of the involuntary Function.

But concerning theſe Nerves of the third pair, which are properly called the Moving nerves of the Eyes, we obſerve, that in Man, a Dog, and in ſome other living Creatures they are found to be ſomewhat otherwiſe than in an Ox: for either nerve in theſe, as in the reſt, is carried out of the Skull, divided into four branches, three of which are carried from thence into three ſtraight diſtinct Muſcles, to wit, one lifting up, the other bringing together, the third preſſing cloſe the Eye; the other branch of it goes forwards further with a ſingle trunk, and is implanted in the middle of the Muſcle going about the Eye, turning obliquely to the inward corner downwards. From theſe it appears, that theſe Muſcles, to which this nerve belongs in all, are ſufficient almoſt of themſelves to perform moſt ſpontaneous motions of the Eye: but where the aforeſaid nerve is divided into four ſhoots, it conſtitutes a ſmall and round infolding, out of which many ſmall ſhoots creep through, and variouſly compaſs about the trunk of the Optick nerve; for what uſe it is ſo made, we have already intimated.

The fourth Conjugation of Nerves (which we call rightly the Fourth by order and ſucceſſion, although it is accounted the eighth and laſt by *Fallopius*) hath a diverſe origine from all the reſt. For whereas moſt of the others proceed from the foot or ſides of the oblong Marrow, this hath its root in the top of it behind the round Protuberances, called *Nates* and *Teſtes*: From whence, bending more forward nigh the ſides of the oblong Marrow, it is preſently hid under the *Dura Mater*; under which going along for ſome ſpace, and paſſing through the Skull at the ſame hole with the reſt deſtinated to the Eye, it is beſtowed with a ſingle trunk, not communicating with any of the other nerves, wholly on the Muſcle called the *Trochlear* Muſcle. Above we called theſe nerves the *Pathetick* nerves of the Eyes: for although ſome beſides may deſerve this name, (as ſhall be ſhewn by and by) yet 'tis moſt likely, that the proper

proper office of theſe is to move the Eyes pathetically, according to the force of the Paſſions and inſtinct of Nature, delivered and remanded from the Brain to the Cerebel, and ſo on the contrary, from this to that through the *Nates* and *Teſtes*, and their medullar Proceſſes. For, as we have ſhewn, that by the diverſe impulſe and waving of the animal Spirits dwelling in this by-path, there are inſtituted certain mutual commerces between the Brain and the *Præcordia*, (the Cerebel mediating between either) it will be of neceſſity, that theſe nerves, rooted in the middle way, ſhould be ſtruck by every tending downwards or remove of the Spirits, going this way or that way, and ſo the motions of the Eyes to follow the affections of thoſe parts. All perfect Animals are furniſhed with theſe nerves; and in truth, as none of them but are obnoxious to Anger, Love, Hatred, and other Affections, ſo every little Creature ſhew theſe by the mere aſpect and by the geſture it ſelf of the Eyes. We ſee ſometimes the greater Pike gaping for his prey firſt of all to roll about his eyes, and to look ſour; then with a ſwift ſhooting out of his body to invade the leſſer fry of fiſh.

CHAP. XXII.

The fifth, ſixth, and ſeventh Pair of Nerves are unfolded.

OF the aforeſaid four Pair of Nerves, the two former ſeem chiefly to ſerve for the Senſe only, but the two latter for Motion; and every ſingle nerve of them deſtinated to a peculiar Province: but this which follows next, to wit, the fifth Conjugation of Nerves ſerves for the exerciſe of either Faculty, to wit, both of Senſe and Motion; nor is its Province ſo ſtrictly bounded, that it ſhould belong only to one member, for it is diſtributed to the Eyes, Noſe, and Palate, and the reſt of the parts of the Face; and beſides, helps in its part in ſome ſort the offices and actions of the *Præcordia* and almoſt of all the *Viſcera*.

This pair (which by the Ancients was accounted the third, by us the fifth pair, and that by right of order or poſition) below the former nerves, proceeds with a broad and large trunk from the ſides of the annular Protuberance or Proceſs ſent out from the Cerebel. It conſiſts of very many Fibres gathered together, ſome of which are ſoft, others hard; ſo that the great trunk of it near its beginning, is nothing elſe than a little bundle of very many nerves, ſome of which are beſtowed on theſe parts, and others on other parts, and in ſome they perform the offices of motion, in others of ſenſe. But that ſo many nerves being deſtinated to ſo many ſeveral members, and remote one from another, yet ariſing together, are collected as it were into one bundle, the reaſon is, that in all the parts to which thoſe nerves belong, a certain Sympathy and conſent of actions might be conſerved: to wit, the communion of thoſe nerves is the cauſe why the ſight and ſmell move ſpittle and pleaſe the Palate; nor by any other means are the *Præcordia* affected, according to the various conceptions of the Brain, and tranſmit their affections o he ſeveral parts of the Face; from whence the aſpect or countenance of the whole Animal is pathetically figured, as ſhall be ſhewed more particularly below.

In the mean time, let us deliver a ſhort Hypotype or figure of this Nerve; its trunk going out of the ſides of the greater Ring, ſometimes near its beginning, but oftner the *Dura Mater* being firſt perforated or paſſed through, is divided into two noted branches. The firſt of theſe tending ſtraight downward, going out of the Skull at a proper hole, in its deſcent towards the lower Jaw, (to whoſe parts it is chiefly deſtinated) is divided into more branches, with which it furniſhes the Temple-muſcle, alſo the Muſcles of the Face and Cheeks. Moreover from them ſhoots and branches are diſtributed into the Lips, Gums, roots of the Teeth, Jaws, Throat, the farther end of the Palate, yea and the Tongue; for this reaſon chiefly, that the nerves going out of the lower branch of the fifth pair, might effect, beſides ſenſe, the divers offices of Taſte and Touch or Feeling, and motions of a various kind in the aforeſaid members and parts; moſt of which, as the chewing of the aliment, alſo thoſe which have reſpect to configuration or framing of the mouth and face in laughing or weeping (as we have already noted) are performed unknown to the Brain, that is involuntarily, and by the help of the Cerebel only, from which theſe Nerves are derived.

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The other ſuperior, and alſo the greater branch of the fifth pair under the *Dura Mater* nigh the ſide of the Turkey Chair goes ſtraight forward for a little ſpace, and is inlarged into ſome ſhoots over againſt the pituitary Glandula to the trunk of the Carotick Artery or the wonderful Net, (where it is preſent) then it is inoculated into the nerve of the ſixth pair, and from thence ſends back ſometimes one, ſometimes two ſhoots; which being united with another ſhoot, turned back from the nerve of the ſixth pair, conſtitute the root or firſt trunk of the intercoſtal Nerve. Concerning this intercoſtal nerve, which is made of the lower ramification or branching out of the nerves of the fifth and ſixth pair, it ſhall be ſpoken of particularly hereafter.

Preſently after the branches or ſhoots reflected or bent back for the root of the intercoſtal nerve, that greater nerve of the fifth pair is divided into two noted branches. The leſſer and uppermoſt of theſe tending towards the globe of the Eye, and becoming again twofold, ſends forth two branches from it ſelf; one of which turning towards the inward ſide of the Bone, containing the ball or angle of the Eye, is divided into two ſhoots. The other of theſe having paſſed through the Bone nigh the mammillary Proceſſes, is carried into the noſtrils: the office of this nerve is to keep a Sympathy and conſent of action between the noſtrils and ſome other parts: but the other branch of this diviſion is beſtowed on the Muſcle by which Brutes wink.

The ſecond Ophthalmick branch of the fifth pair is divided into four or five ſhoots, all which going forward above the Muſcles of the Eye, and in ſome part paſſing through its Glandula's, are almoſt all loſt in the Eye-brows, unleſs that in the paſſage they ſend down two ſmall ſhoots which enter the *Sclerotick* Coat a little below the Tendons of the Muſcles, and reach to the *Uvea*, or the fourth thin Membrane that cloaths the Optick nerve; yea and alſo ſend in the paſſage ſmall ſhoots to the Glandula's of the Eye. It ſeems that theſe nerves of the fifth pair, being diſtributed into the Glandula's of the Eyes and Eye-brows, ſerve chiefly to the involuntary and pathetick actions of thoſe parts; the chief of which are, the languiſhing and mournful aſpect of the Eyes in weeping, and the unwilling pouring out of tears. For as the lower branching of the fifth pair, to wit, the intercoſtal nerve, provideth in man for the *Præcordia*, it eaſily happens, that from the ſad affection of theſe, the Cardiack branches of this nerve being forced and wrinkled into Convulſions, the aforeſaid Ophthalmick branches alſo ſo correſpond, and by wrinkling the Eye-brows, and by compreſſing the Glandula's, produce thoſe kind of looks of the Eyes, and marks of ſorrow and grief. Further it is obſerved, that from the Ophthalmick branch of the fifth pair a certain ſhoot is ſent back higher nigh the heads of the Muſcles; which when it has paſſed through at a proper hole, the Bone containing the ball of the Eye, is carried ſtraight into the caverns of the Noſtrils. Hence, as I think, a reaſon may be given, wherefore paſſing out of a dark place into the light, at the firſt beholding of the Sun, preſently whether we will or no we ſhall ſneez; to wit, the eyes being too ſtrongly ſtruck by the object, and being ſuddenly and diſorderly moved, that they might turn themſelves aſide, the ſame affection is immediately communicated through the aforeſaid Nerve to the Membrane covering the hollow caverns of the Noſtrils, which being thence contracted and wrinkled, (as it is wont by ſome ſharp thing pulling it) provokes ſneezing.

The ſecond or greater branch of the ſecond diviſion of the Nerve of the fifth pair being carried nigh the ball of the Eye, is again divided into two branches. The lower of theſe being bent downwards, cleaving into many ſhoots, is beſtowed on the Palate and upper region of the Jaws: The other and higher branch of this ſecond diviſion ſtretching beyond the ball of the Eye, paſſes through, together with the Vein and Artery, a proper hole made in the bone of the upper Jaw; which Veſſels this Nerve climbs and variouſly compaſſes about with many ſhoots ſent forth; then ariſing out of the bone, it imparts little branches to the Muſcles of the Cheeks, Lips, Noſe, and to the roots of the upper Teeth. Therefore foraſmuch as this Nerve embraces and binds about the ſanguiferous Veſſels deſtinated to the Cheeks and the other parts of the Face; from hence a reaſon may be given, why the face is covered with bluſhing by ſhame: for the animal Spirits being diſturbed by the imagination of an unſeemly thing, by and by endeavouring as it were to hide the face, their irregularities enter this Nerve, ſo that the ſhoots of the ſame Nerve embracing the blood-carrying Veſſels, by compreſſing and pulling the ſame, cauſe the blood to be more forced into the Cheeks and Face, and the Veins being bound hard to be there for ſome time ſtaid and detained. But foraſmuch as many ſhoots and fibres of the ſame maxillar Nerve, derived

from

from the fifth pair, interweave themſelves with the fleſh and skin of the Lips, hence the reaſon is plain; why theſe parts are ſo very ſenſible, and beſides, why the mutual kiſſes of Lovers, impreſſed on the Lips, ſo eaſily irritate love and luſt by affecting both the *Præcordia* and Genitals; to wit, becauſe the lower branching of the ſame fifth pair actuates theſe parts conſtituted in the middle and lower Belly, and draws them into the like affection with the Lips. The ſame reaſon holds of Love preſently admitted by the eyes, that as the Poet ſays,

Mars videt hanc, viſámq; cupit.
As ſoon as Mars *ſaw her, he deſir'd her.*

We have but now intimated, that many ſhoots of this Nerve were deſtinated for the buſineſs of chewing; and therefore, becauſe the aliments to be taken ought to undergo not only the examination of the taſte, but alſo of the ſmell and ſight, from the ſame Nerve, whoſe branches being ſent to the Palate and Jaws, perform the buſineſs of chewing, other ſhoots, as it were fore-runners, are carried to the Noſtrils and Eyes, to wit, that theſe Organs of the other Senſes might be furniſhed with ſome helps of probation alſo, for the better knowing or diſtinguiſhing the objects of taſte. Certainly from the nearneſs of kindred and manifold affinity of this Nerve, being alſo much diffuſed in the Head, the mutual dependencies and confederations of very many of its parts, proceed. But how this Nerve in other Provinces, to wit, in the *Thorax* and lower belly, and there about the motions and ſenſions of the *Præcordia* and *Viſcera*, doth cauſe various Sympathies of them among themſelves and with other parts, ſhall afterwards be more largely ſhewn, when we ſhall ſpeak particularly of the intercoſtal Nerve, which is rooted in this nerve of the fifth pair; where, from the manifold communication of this nerve, may be eaſily drawn the reaſons of ſneezing, yawning, laughing, crying, and of other actions merely natural. In the mean time, the ſuperior branching of the nerve of the fifth pair ſhews it ſelf after this manner in the Head, and almoſt after the ſame manner is divaricated in moſt living Creatures; except however, that in ſome, preſently after its riſe, it is divided into three great branches; one of which is deſtinated to the lower Jaw, the other to the Eye and Noſe, and the third to the Cheek.

The Nerve of the ſixth Conjugation follows, which ariſing out of the loweſt foot of the annular Protuberance, and being hid under the *Dura Mater*, preſently goes out of the Skull at the ſame hole with the nerves of the third and fourth pair, and is carried with a ſingle trunk into the ball of the Eye; but ſo, that near the ſide of the Turkey Chair it is inoculated with the ſecond branch, or the greater of the fifth pair; from whence it turns back, ſometimes one little branch, ſometimes two; which being united with the branches of the fifth pair running back, conſtitute the beginning of the intercoſtal nerve. Then this nerve going forwards, is divided into two branches near the ball of the Eye; one of which is inſerted into the Muſcle drawing back the Eye planted in its outward angle; and the other being torn into various fibres, is beſtowed on the ſeventh Muſcle proper to Brutes; ſo that this nerve alſo ſeems to ſerve to thoſe motions of the Eye that are almoſt only pathetick, or excited by natural Inſtinct. For, as to the uſe of the former ſhoot, it plainly appears, that it is innate to every Animal in a ſudden fear to draw the eyes backward, and to look for what is to be feared on either ſide and behind: then as to its other ſhoot, whereby Brutes wink or twinkle the eye, it is obvious that this ſame motion is ſudden and extemporary, without any previous intention, whereby the eye endeavours to ſhun the injuries of outward things that occur.

The ſeventh Conjugation of Nerves, accounted for the fifth by the Ancients, is imployed about the ſenſe of hearing. Of this pair commonly are noted two Proceſſes, the one ſoft, the other hard; which indeed ſeem to be two diſtinct nerves, for that although they have their beginnings nigh one another, yet are ſomewhat diſtinct, and are carried to divers Organs; in the mean time, either agreeing in a certain common reſpect of uſe or action. For whilſt one nerve performs the act of hearing, the other ſupplies ſome requiſites whereby that act may be the better performed: wherefore we ſhall not much ſtrive againſt the common deſcription of this pair, by which it is taken for one. The proceſs of this pair, or the auditory nerve properly, which is called the ſoft Branch, ſeems to ariſe in man out of the lower ſide of the ringy Protuberance, and in beaſts out of the midſt of the leſſer Ring. In ſome Diſſections I plainly found, that this ſofter nerve, having its beginning lower, ſeemed

to aſcend a little before it went out of the medullar ſtock; and the other more hard nerve ſeeming to ariſe higher (*viz.* out of the medullar whitiſh line leading about the bottom of the fourth Ventricle) did deſcend a little, and aroſe near the meeting with the other. This ſofter nerve is carried into the paſſage of the ſtony Bone, where entring into the den deſtinated for the receiving the ſound, which is on this ſide the Snail-like winding and the Drum, it ſo infolds it ſelf into the moſt thin Membrane wherewith that den is covered, that as often as the Air implanted in that cavern is moved by the ſtroke of the external Air made upon the Drum, this impreſſion ſtriking this Membrane, and ſtirring up as it were an undulation of the animal Spirits, is forthwith carried towards the common Senſory by the paſſage of the nerve there implanted. There will be a more opportune place of diſcourſing, after what manner, and by what ſort of Organs Hearing is performed, when we ſhall ſpeak of the Senſes.

The other Nerve of this pair, or the more hard proceſs, which conduces rather to motion than ſenſe, paſſing through the ſtony Bone at an hole proper to it ſelf, ariſes near the auditory paſſage, where it preſently receives into its trunk a branch from the wandring pair brought thither; then immediately after that joyning together or coalition, it is divided into two branches: The firſt of theſe tending downwards, is beſtowed upon the Muſcles of the Tongue and the Bone *Hyoides*; the other going about the auditory paſſage, and bending more upwards, is divided into three ſhoots; the firſt of which, anſwering to the nerve of the former diviſion, beſtows ſome ſhoots on the Muſcles of the Lips, Mouth, Face, and Noſtrils, and ſo actuates ſome exterior Organs for the forming the voice, as the former doth ſome interior Organs. The ſecond ſhoot of this diviſion diſtributes its ſhoots into the Muſcles of the Eyebrows and Forehead; and the third into the Muſcles of the Ear it ſelf. The offices and uſes of all theſe have been already ſhewn, the ſumm of which is, that as often as the ſound is admitted in, eſpecially if it be any ways unuſual, new, or to be wondred at, preſently by a certain natural inſtinct the Ears and Eyes erect and open themſelves: to wit, for that end ſhoots from this nerve are inſerted into the Muſcles of the Eye-lids and Ears, that by the paſſage of theſe, the Spirits inhabiting either Region, might be called out as it were to watch. For a like reaſon ſhoots from the ſame hard proceſs of this nerve are diſtributed both into the Muſcles of the Tongue and of the Bone *Hyoides*; as alſo into thoſe of the Lips and the outward parts of the Mouth, that by their paſſage, the ſound being tranſmitted further to theſe Organs of the voice, it being equal or like the ſame, might officiouſly anſwer it as were an *Echo*. That the deſcriptions of the aforeſaid nerves might be better underſtood, I have thought good here to repreſent in the following Figure the branchings of the fifth and ſixth pair. The ſeventh pair is fitly delineated in the ninth Figure.

This Figure ſhews the Branchings of the fifth and ſixth pair of Nerves.

A. *The Nerve of the ſixth pair (which we place firſt, becauſe it is outmoſt in the Scheme) from whoſe trunk two ſhoots* a. a. *are carried into the two Muſcles of the Eye.*

A. *A ſhoot from the Nerve of the ſixth pair bent back for the root of the intercoſtal Nerve.*

B. *The trunk of the fifth pair being preſently divided into two great branches.*

bb. *Two ſhoots from this branch bent back for the root of the intercoſtal Nerve.*

C. *The diviſion of the upper part of the trunk into four leſſer branches, the uppermoſt of which* c. *being the Ophthalmick or belonging to the Eye, and entring the orb of the Eye, ſends forth four ſhoots.*

c. *The firſt being carried nigh to the ball of the Eye, is bent back into the Noſtrils.*

d. *The ſecond paſſing by the outward orb of the Eye, is carried into the Muſcles of the Forehead.*

ee. *The third and fourth are diſtributed into the Eye-lids and interior Glandula's of the Eye.*

D. *The ſecond branch of the ſecond diviſion is alſo Ophthalmick, which entring the ball of the Eye, and carried towards the outward corner of the Eye, is diſtributed into the Eye-lids and outward Kernels.*

E. *The third branch of the ſecond diviſion, or the maxillar, which paſſing by the orb of the Eye, enters an hole proper to the bone of the Jaw, in which paſſage it ſends forth*

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Fig: I.

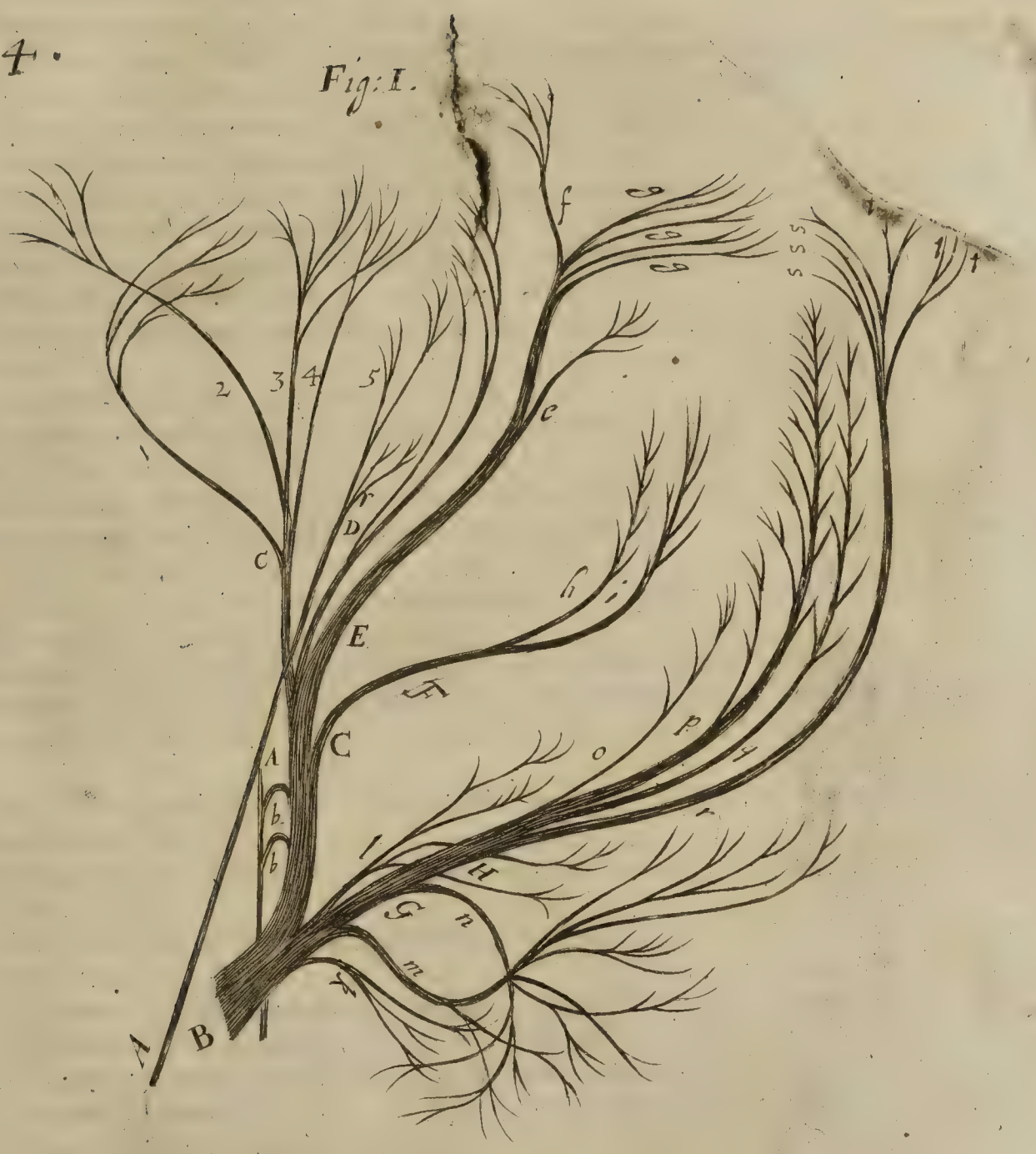
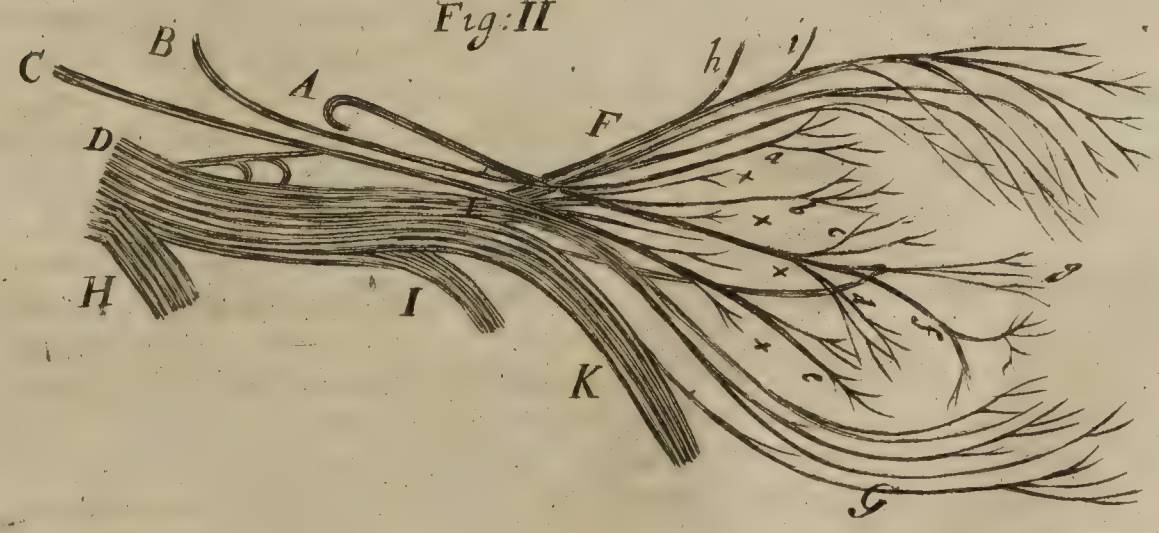


Fig: II


C
B
A
D
H
I
F
K
h
i
a
a
a

forth a ſhoot e. *through another hole into the chewing Muſcle, then ariſing up, it is carried out at the hole.*

f. *A ſhoot into the Muſcles of the Noſe.*

ggg. *It ſends forth many ſhoots into the upper Lip.*

F. *The lower branch or the fourth of the ſecond diviſion, which deſcending right towards the hollowneſs of the Mouth, is divided into two branches.*

h. *The firſt is diſtributed into the Gums.*

i. *The ſecond is beſtowed with many ſhoots upon the Palate.*

G. *The ſecond branch of the firſt diviſion of the fifth pair, which tending ſtraight downwards towards the lower Jaw, ſends forth in its paſſage many ſhoots.*

k. *A ſhoot of it into the Parotid Glandula's, or thoſe near the Jaws.*

l. *A ſhoot to the inward Mandible.*

m. *A ſhoot which compaſſing about the proceſs of the lower Jaw, is carried to the outward part of the exterior Maſticator.*

n. *Another ſhoot tending oppoſite to the former, having compaſſed the ſame proceſs, is diſtributed into the inward part of the ſame Maſticator.*

H. *The trunk of the ſame greater branch carried further, is cleft into many ſhoots, of which*

o. *Tends into the root of the Tongue.*

pp. *Is carried with many ſhoots into the ſubſtance of the whole Tongue.*

q. *Into the parts under the Tongue.*

r. *Paſſing through the bone of the Jaw, is divided into many ſhoots which are diſperſed, partly into the lower Lip* s s.s. *and partly into the Chin* t.t.t.

The Second Figure ſhews all the Nerves, which being carried from the Nerves of the third, fourth, fifth, and ſixth Pair, are beſtowed upon the Muſcles and other parts of the Eye.

A. *The Nerve of the third pair carried to the three ſtraight Muſcles, and into the outward oblique one.*

B. *The Nerve of the fifth pair, or the pathetick Nerve, goes whole into the trochlear Muſcle.*

C. *The Nerve of the ſixth pair into the drawing back Muſcle, and the ſeventh proper to Beaſts.*

D. *The Nerve of the fifth pair whoſe Ophthalmick branch* E. *is divided into two branches.*

F. *The upper branch, being preſently torn into many ſhoots, tends directly towards the inner corner, where it is beſtowed on the Glandula's and Eye-lids.*

G. *The lower Ophthalmick branch, which being divided into ſhoots, reſpects after a like manner the Glandula's and Eye-lids towards the outward corner of the Eye.*

a. *The Nerve of the fourth pair for the trochlear Muſcle.*

b. *A branch of the Nerve of the third pair for the Muſcle lifting up the Eye-lids.*

c. *A branch of the ſame pair for the Muſcle ſhutting the Eye-lids.*

d. *A branch of the ſame Nerve for the Muſcle preſſing cloſe the Eye-lid.*

f. *A branch of the ſame for the outward oblique Muſcle.*

g. *Leſſer Nerves out of the infolding of the third pair, tending through the Sclerotick Coat into the* Uvea.

e. *The Nerve of the ſixth pair for the drawing-back Muſcle.*

*** *Fibres or leſſer branches from the fifth and ſixth pair for the ſeventh Muſcle, proper to Brutes.*

h. *A Nerve coming from the upper Ophthalmick branch into the Noſtrils.*

i. *A Nerve from the ſame branch into the Eye-brows and Forehead.*

H. *The trunk of the fifth pair cut off, which tends to the lower Jaw.*

I. *A branch of the ſame cut off, which is carried to the Palate.*

K. *Its upper maxillar branch.*

CHAP. XXIII.

The Description of the eighth Pair of Nerves.

THE Conjugation of the Nerves of the eighth pair, accounted by the Ancients for the sixth, is called the Wandring pair; to wit, for that its Nerve, not content with one member or region of the Body, is thought to respect divers parts, and those different, and situate at a great distance one from another, and to reach forth its branchings, not only in the neighbourhood about the Head and Neck, but through the whole cavity of the middle and lowest Belly, and to most of the Bowels in either. But indeed this nerve hath a province large enough, yet not so diffuse as is commonly thought: for many other nerves, inoculated into this, joyn themselves with it, and are accounted a part of it, although they have distinct beginnings, and going away again from the nerve of the eighth pair, have peculiar divarications, and different from it. Wherefore, that we may give to each its own, we shall endeavour to prosecute this nerve of the wandring pair from the beginning to the end; and also shew the confederations and coincidences or joynings together of others with it.

The eighth Conjugation therefore of the Nerves arises below the auditory or hearing nerves out of the sides of the oblong Marrow, its root consisting of numerous Fibres. In a man there are at least twelve, some of which are greater, others smaller; to which is added a noted Fibre, or rather Nerve, much greater than the rest, from the spinal Marrow, which being joyned with them, and wrapped about with the same Coat, taken from the *Dura Mater*, goes forth together out of the Skull, as if they all grew into one Trunk: but that accessory nerve, yea and many other Fibres, do still remain distinct under that covering, and afterwards departing asunder, are carried into peculiar provinces.

Because this spinal Nerve having passed the Skull, leaving its Conjugation, is carried to the muscles of the Neck and Shoulders; besides, the noted Fibre, out of the beginning of the wandring pair, is presently carried into the hard process of the seventh Conjugation; and two other Fibres, having presently left the company of the rest, go into the muscles of the Throat and Neck: but the rest of the Fibres, being collected together, go forward still as Companions, and instead of their other Companions which departed from them, they presently get new in their places; to wit, sometimes the whole trunk of the intercostal nerve it self, as is seen in most four-footed Beasts, sometimes only a branch of it comes to them, as is observed in Man and some other living Creatures.

In this place where the trunk or branch of the intercostal Nerve is inoculated into the trunk of the wandring pair, a noted infolding is constituted, to wit, the trunk of the nerve being there made greater, seems to be lifted up, and to grow out into a certain Tumor like to a callous or sinewy-swelled body: here, for that it is somewhat long, it is called by *Fallopius* the Olive body; of which sort the same Author affirms, there comes to this nerve sometimes one, sometimes two; but in truth, one is constantly found in the trunk of the wandring pair, but the other in the neighbouring intercostal.

Of these sort of infoldings in general we shall take notice, that they are made in the Nerves, as joynts in a Cane, or knots in the stem of a Tree, *viz.* as often as a branch goes out of the trunk, or sliding into another place, is received into the same; and when oftentimes some shoots go away from the same place, and others come to it, the infolding there becomes greater; and so the more branches and shoots do happen to come together any where, or to go out of a nerve, the greater the bulk and magnitude of the infolding is increased: but if at any time a branch seems to proceed from any nerve without constituting an infolding, in truth, being included only in the same Coat, it is not accounted so much a branch as a companion, which by a passage long before, had gone together forwards, as a single nerve it self, and distinct enough, nor was it at all inoculated before its departure. But the use of these same infoldings seems to be the same with the knots in the stem of a Tree, or such as the turnings aside or by-paths that lye near cross-ways; to wit, that when the animal Spirits, together

gether with the nervous Juyce, inſtitute divers journies, leſt mutually meeting, they ſhould be confounded, they may be able to turn aſide a little, and depart one from another till they may recover their orders and juſt method.

In the Diſſection of the Nerves, which are diſtributed to the *Præcordia* and *Viſcera*, the two Ganglioform infoldings, to wit, the aforeſaid in the trunk of the wandring pair, and the other near growing in the intercoſtal nerve, are as it were two bounding ſtones, which being firſt diligently traced, the other threads of the Anatomical task, both on this and that ſide, are eaſily handled. But that theſe infoldings may be found, the trunk of the *Carotidick* Artery is laid open on both ſides between the Muſcles of the Neck; then by following its tract, the aforeſaid Olive bodies come into view about the inſertion of the lower Mandible; out of which, both the upper beginnings and the lower branchings of either nerve, may be deſigned or drawn. But becauſe about this place the nerves begin to be figured otherwiſe in a Man than in Brutes; that the reaſon of the difference may be known, we will here proſecute apart and diſtinctly the *Neurologie* or Doctrine of the Nerves of either; and firſt we ſhall deliver the *Hypotheſis* of the wandring pair, and its confederations with the intercoſtal and other nerves, as they are found in Man.

The Ganglioform infolding therefore being conſtituted upon the Trunk of the wandring pair, receives one Nerve ſent into it elſewhere, and ſends forth another from it ſelf. To this is brought a ſhoot from the intercoſtal nerve different from moſt brute beaſts, where the whole trunk of the intercoſtal nerve comes, and ſeems to be united to the wandring pair. But from the aforeſaid infolding, a noted branch being ſent forth, is carried towards the *Larynx*, which when it is divided into three ſhoots, the firſt of them is ſtretched out into the Sphincter of the Throat; the ſecond being hid under the Scutiform or Shield-like Cartilage, diſtributes its ſhoots to the upper Muſcles of the *Larynx*, and to the Muſcles by which the chink of the *Larynx* is ſhut up; and the third alſo entring the Shield-like Cartilage, meets the top of the returning nerve, and is united to the ſame. Such an inoculating of this nerve, with the returning nerve, is conſtantly found in man and in all other perfect Animals; the reaſon of which is delivered anon.

Below the aforeſaid infolding of the wandring pair, its ſtem, near the ſide of the aſcending Caroditick Artery, goes forward ſtraight downwards, and in its journey imparts ſome ſmall ſhoots to the ſame, which ſometimes compaſs about the trunk of its Veſſel, ſometimes are inſerted into its Coats. In the lower part of the Neck this trunk of the wandring pair admits a branch of the intercoſtal nerve from its neighbouring infolding, and in the left ſide about that place ſends forth another nerve from it ſelf into the returning nerve; which croſs branch, being ſtretched out only in the left ſide, is found in man and all brute beaſts: but from thence the trunk of the wandring pair deſcends without any noted branchings till it comes over againſt the firſt or ſecond Rib; where another infolding being made, many ſhoots and numerous fibres are ſent forth towards the Heart and its Appendix. But this divarication of the Cardiack nerves is not after the ſame manner altogether in either ſide.

For in the left ſide one or two noted ſhoots being ſent forth, together with other ſhoots ariſing from the intercoſtal Nerve, are inſerted into the Cardiack infolding; but many fibres going out at the ſame place, are diſtributed to the Veſſels hanging to the Heart, and to its little Ears and *Pericardium*. In the right ſide a noted ſhoot going into the greater *Cardiack* infolding, another into the leſs, and two other ſhoots from the middle infolding of the intercoſtal Trunk towards the Cardiack infolding, aſſociate themſelves and are united. Beſides, numerous Fibres in like manner deſcend into the Veſſels of the Heart and the *Pericardium*. Alſo the returning Nerve in this ſide ariſing higher, is turned back about the axillary Artery, when in the left ſide the ſame going away much lower than this infolding, from the Trunk of the wandring pair, compaſſes about the deſcending Trunk of the Aorta, and from thence it is turned back upwards.

The returning Nerve, although it ſeems a branch ſent forth from the Trunk of the wandring pair, being indeed a diſtinct and ſingular nerve, comes even from the beginning of the wandring pair; yet for better conducts ſake it is contained under the ſame Coat with the reſt of the Trunk of the wandring pair. In either ſide about the knots of reflection or turning back, it ſends forth ſhoots and fibres which are diſtributed into the Veſſels of the Heart. The reflected Nerve in its aſcent receives in the left ſide a branch from the middle infolding of the Intercoſtal, and another from the

the wandring pair; but either running back, diſtributes many ſhoots to the rough Artery; then its extremity meeting with the ſhoot, which is ſent out of the Ganglioform infolding of the wandring pair, is united to it.

A little below the coming away of the returning Nerve on the left ſide from the Trunk of the wandring pair, another noted branch is ſent forth on both ſides; which being carried towards the Heart, covering its Baſis in the hinder Region, meets it on both ſides, and diſperſes in all its proceſs branches through the whole Superficies of the Heart. As ſhoots go from theſe branches into the hinder part of the Heart, ſo many branches and ſhoots go from the Cardiack infoldings which are divaricated into its fore-part.

But there are two Infoldings from which the Nerves are diſtributed into the Heart. The upper and greater is between the *Aorta* and the Pneumonick Artery. The nerves conſtituting this are one or two noted branches that deſcend hither from either ſide the Trunk of the wandring pair; but chiefly many nerves from either intercoſtal nerve, to wit, from the midſt of its infolding. From this infolding two or three noted nerves are carried under the Aorta into the left ſide of the Heart. But from this infolding, a ſhoot being ſent forth, making as it were an handle, compaſſes about the pneumonick Artery; and a branch deſcending from the right Trunk of the wandring pair to the exterior part of this handle, and another, which being carried from the nerve which is deſtinated to the hinder region of the Heart, meet together and make the leſſer infolding; from which nerves are ſent into the right ſide of the fore-part of the Heart.

We are to take notice, That in brute Animals many more and far greater Nerves are carried from the Trunk of the wandring pair into the Heart and its Appendix than in Man, to wit, in whom the chief Cardiack nerves or belonging to the Heart proceed from the intercoſtal pair, as is ſhewed below; wherefore in Brutes, for that reaſon, the wandring pair affords greater ſupplies or ſubſidies to the Heart, becauſe the intercoſtal nerve ſcarcely contributes any to it. Further, through the whole tract of the wandring pair, from whence the Cardiack nerves proceed, very many ſmall ſhoots, being ſent forth on both ſides, are inſerted into the *Oeſophagus* and the Glandula's implanted without the *Pericardium*.

From the Region of the Heart, the Trunk of the wandring pair ſends forth many noted ſhoots on both ſides, which being carried into the Lungs, are diſtributed, together with the blood-carrying Veſſels, through their whole ſubſtance, and in their paſſage ſtep by ſtep they follow the Pipes of the *Bronchia*, both the Arteries and the Veins, and many ſhoots being ſent forth on every ſide, they climb upon and compaſs about theſe Veſſels; then the Trunk of the ſame wandring pair, deſcending on both ſides, nigh the ſides of the *Trachea*, diſtributes many ſhoots alſo into the Coats of the *Oeſophagus*.

Below the Pneumonick branches, either Trunk of the wandring pair going forwards downwards nigh the ſides of the *Oeſophagus*, is divided into two branches, *viz.* into the exterior or more outward, and the interior or more inward. Both the inward branches inclining towards one another mutually, do again grow into the ſame Nerve, which being ſent ſtraight down towards the *Oeſophagus*, and being carried nigh the inward part of its Orifice, is bent back from thence, and creeps through its upper part. From both branches, being carried nigh the oppoſite parts of the ſuperior Orifice, many ſhoots are produced, which being mutually inoculated, do conſtitute the nervous infolding like a little net. The Stomachical lower branch ſends forth very many fibres and ſhoots nigh the left part of the bottom of the Ventricle, which are united with others, ſent forth from the Meſenterick and Splenetick infolding. Further, in the right part of the ſame bottom of the Ventricle, ſhoots being ſent forth from either Stomachical branch, are united with other ſhoots ſent upwards from the Hepatick infolding; and about this place either Trunk of the Nerves of the eighth pair ſeems to be terminated, for that the laſt that may be perceived of it are ſome ſhoots ſent forth from the Stomachical branches, which are inoculated or ingraffed with the little branches or fibres ſent upwards from the Meſenterick infoldings.

CHAP.

CHAP. XXIV.

The Actions and Uſes of the Nerves of the eighth Pair, deſcribed in the foregoing Chapter, are unfolded.

AFter this manner the beginning and branchings out of the Nerves of the eighth pair are diſpoſed in Man: and they are almoſt after the ſame manner in Brutes, unleſs the Cardiack branches be more, becauſe in theſe they go out only from this one Conjugation. The Figure or Type of all theſe is well deſigned or drawn in the ninth Table or Figure. It now remains, recollecting the Tracts of this Deſcription, or at leaſt the things chiefly to be noted, that we inquire into the Reaſons of their *Phænomena* or Appearances.

This Nerve, preſently after its riſe, appears with numerous Fibres, as may be diſcerned in the ninth Figure *E*: the reaſon of which is, becauſe many nerves here ariſing together, and deriving plenty of animal Spirits from the ſame ſtock or proviſion, ought to carry the ſame to divers parts, and remote one from another; and therefore they aſſume their *Latex* or Juyce, not at one Trunk, as the blood-carrying Veſſels, and afterwards diſtribute it equally by branches and ſhoots here and there ſtretched out; becauſe the Spirits, derived from the ſame Fountain, have need to flow into theſe parts ſeparate from them, and variouſly to tranſpoſe and change their influence: wherefore for this buſineſs it is required (that we may not ſuppoſe little doors in the middle of the branchings out of the nerves, as are in the Pipes of a muſical Organ) that the nerves, which are deſtinated for the performing of divers offices reſpectively in diſtinct parts, ſhould be ſingle in their whole paſſage, and of themſelves diſtinct chanels of Spirits; for the ſake of a better conduct many of them are collected together, and ſeem to grow together into one Trunk; but they are parted both in their beginning, and alſo in their whole journey, and diſtinguiſhed, though involved in the ſame Coat, and ſo are carried to the reſpective parts. Otherwiſe how ſhould it come to paſs, that the Spirits to be carried for the performing the inſtinct of motion towards the Stomach, do not enter at the ſame time the Lungs or *Præcordia*, and actuate them with an inordinate influence? For indeed the ſhoots of the nerves of the wandring pair may be followed by the eyes and hand backwards towards the beginning, from the parts into which they are inſerted, and where they ſeem to be united into the ſame Trunk, ſo ſeparated with the finger, that it may appear they are ſingle. After the ſame manner we have plainly ſeparated one from another the returning nerve alſo, and others, their common Coat being diſſected. Yet in the mean time we deny not, that in their progreſs they do communicate one with another by Fibres meeting mutually, if it be granted, that the ſame, although they ariſe together, in their very riſe it ſelf are in a manner diſtinct. For by reaſon of the nearneſs of the beginning and progreſs, though all the nerves of the wandring pair have a certain Sympathy and conſent in their actions; yet for that they conſiſt of parted ſtrings, they perform their actions ſucceſſively, and convey the influences of the Spirits to theſe parts ſeparate from thoſe.

We have already ſhewn, that the Nerve of the wandring pair, and others belonging to its family, do ſerve almoſt only to the involuntary Function. Wherefore it may be thought, that as there are many ſhoots and fibres, which going out diſtinctly from the ſame origine, are carried to divers parts, that indeed thoſe Bowels and Members, into which theſe nerves are inſerted, do perform their particular actions, ſtirred up either by the inſtinct of Nature, or by the force of the Paſſions, the Animal in the mean time ſcarce knowing it: yea alſo, that when certain other nerves, ariſing afar off, are joyned to this Trunk of the wandring pair, and communicate with it near the very origine of it; this ſeems to be therefore done, that thoſe nerves, an affinity with the wandring pair being begun, may be drawn into Sympathy with it, and into an unity of action of the involuntary Function. This appears clearly by the acceſſory nerve from the Back-bone, and ſome others, as ſhall be manifeſted anon.

In the mean time, we ſhall obſerve concerning the Fibres of the wandring pair, firſt that a noted ſhoot, inclining towards the vocal proceſs of the ſeventh pair, is united

united with the ſame, as in the ninth Figure *e*. Hence a reaſon may be taken, wherefore in every violent Paſſion, as of Anger, Fear, Joy, and the like, without the will or intention of the Animal, the Tongue ſends forth a voice, as an index of the excited affection; ſo that not only men, but ſome brute beaſts, in their fleeing or rejoycing, wail, cry out, and make a noiſe.

Secondly, From the beginning of the wandring pair very many Fibres are diſtributed into the Muſcles of the Neck, Figure the ninth *FFF*. in which there ſeems little need of the ſtirring up of ſpontaneous motions in that part; for to this task the Vertebral nerves ſerve ſufficiently. Notwithſtanding the aforeſaid Fibres of the wandring pair are the cauſe why the Neck is moved about in fear, or at any noiſe or ſuſpicion of danger; and alſo, why in ſome Animals, from indignation or pride, the Muſcles into which theſe nerves are inſerted, being inflated very much, their necks ſwell up, and the Creſts of many are erected. Of how great uſe the acceſſory nerve, coming from the Spine to the wandring pair, is for the pathetick motions of the Arms, ſhall be ſhewed preſently.

Thirdly, The other Fibres of the wandring pair, being gathered together, ſeem to grow together into the ſame Trunk, which preſently conſtitutes the Ganglioform infolding from a ſhoot coming from the intercoſtal nerve, as in Figure the ninth *G.H.* And indeed it is very likely, that of theſe Fibres, which are complicated together in the Trunk of the wandring pair, one is deſtinated to the returning nerve, another to the *Præcordia*, a third to the Lungs, and laſtly, another to the Ventricle; all which, although they have communication among themſelves, and for the ſake of a better conduct are gathered together in one, yet they are ſtill diſtinct from their very original, and conſtitute divers paſſages of the animal Spirits.

But that a ſhoot is carried from the intercoſtal Nerve into the upper infolding of the wandring pair, as in the ninth Figure *h*; the reaſon is, that between theſe nerves a certain ſtrict affinity and kindred might be, and that either of them might be affected with the others offices. For as the nerve of the wandring pair diſtributes ſhoots chiefly to the *Præcordia*, and the Stomach, and the intercoſtal Nerve to the reſt of the *Viſcera* of the lower Belly; we may obſerve, that between all theſe there are not only ſome commerces, but Sympathies, and a conſent of Actions and Paſſions; wherefore there is a neceſſity, that the nerves deſigned to either parts, ſhould communicate among themſelves. Further, in Man the intercoſtal nerve imparts to the Heart and its Appendix more ſhoots and fibres than the nerve of the wandring pair: wherefore theſe nerves do not only communicate by theſe ſuperiour infoldings, but alſo again a little lower by a ſhoot ſent out from the cervical infolding, or that of the Neck.

From the aforeſaid infolding a noted branch of the wandring pair is ſent forth into the Muſcles of the *Larynx*, a certain branch of which, entring the Shield-like Cartilage, meets with the returning nerve, and is united to it *Fig. 9. h.* It will not be difficult to collect what the uſe of this nerve may be; for ſeeing the *Larynx* or the rough Artery ſerves both for the drawning in and putting out of the breath, and alſo for the modulating the voice; for either office that its Trunk, like the folds in a pair of Bellows, may become ſometimes more ſhort, ſometimes more at length, theſe ſame ringy Cartilages ought to be pulled together, or contracted ſometimes upward, and ſometimes downward. That a flat voice or ſound might be formed, they ought to be preſt down as much as may be to the bottom; but if you would form a more ſhrill or ſharp ſound or voice, the ſuperiour Rings are lifted up; to wit, that the ſound might be broken but only in the very paſſage of the Jaws. For the performing of this double motion of the *Larynx* two nerves are conſtituted like the hands of a Piper, one of which ſtops the lower holes, the other the upper of the Pipe: to wit, the ſhoots and branches of the returning nerve being lifted up from below, move the ringy Cartilages downwards; and the nerve ſent out from above from this infolding, preſently draws the more ſuperior upwards. Further, becauſe a certain conſent and joynt action is required in both nerves, therefore they are mutually inoculated or ingraffed: yea, whenas either of them returning, diſtributes frequent ſhoots into either ſide of the *Trachea*; it ſeems that thoſe that are ſent out into the right part, move its Rings downwards for Inſpiration and a ſtrong Voice; and the others, going out on both ſides into the left part, carry the Rings upward for Expiration and for an acute or ſharp Voice. Moreover, as the inſtinct for the motion of depreſſion or preſſing down is delivered from the knots of the recourſe or reflections; ſo the impreſſion,

preſſion, for the elation or lifting up of thoſe parts, is received from this nerve of the *Ganglioform* infolding.

A noted branch from the middle infolding of the intercoſtal Nerve is carried into the Trunk of the wandring pair, *Fig.* 9. *i.* For what end that is ſo, we have ſhewn already; to wit, that the commerces of the Spirits dwelling in both nerves, might be ſtrengthened: but it ſhould be noted, that it is only ſo in the left ſide where the Trunk of the wandring pair ſhews it ſelf ſingle for a long ſpace; but in the right ſide, where the returning nerve goes from it much higher, here the other nerve from the intercoſtal infolding is plainly wanting.

About the Region of the firſt or ſecond Rib, another noted infolding appears in the Trunk of the wandring pair, from which many ſhoots and fibres are ſent towards the Heart and its Appendix, *Fig.* 9. *k.* Further, in brute Animals, about this place, the intercoſtal nerve leaves the Trunk of the wandring pair. Without doubt, ſome animal Spirits go apart in this infolding, which are deſtinated to the anterior region of the Heart, alſo to the *Pericardium* and ſome of its Veſſels, whilſt other Spirits paſs through, which a little lower are derived into the hinder region of the Heart; and which being yet carried further, go to the Lungs, and laſtly to the Ventricle.

We may obſerve, that from the aforeſaid infolding of the wandring pair numerous ſhoots and fibres are ſent forth, which are diſtributed into the little ears of the Heart and all the ſanguiferous Veſſels belonging to the Heart, *Fig.* 9. *l. m.* which fibres and nervous ſhoots creeping along like Ivy, thickly cover over the Coats of the Veſſels, and enter them in very many places, and variouſly bind them about. Truly this copious diſtribution of the nerves doth effect the pulſifick force in the little ears of the Heart and in the Arteries, or at leaſt ſeems to excite it; and ſo to erect and ſtrengthen thoſe parts by a continual influx of the animal Spirits through theſe nerves, that they may be able to ſuſtain an undiſcontinued reciprocation of *Syſtole* and *Diaſtole*. Moreover, that the thick fibres and ſhoots of the nerves are inſerted both into the Veins and Arteries, and bind both thoſe kind of Veſſels, and variouſly compaſs them about, we may lawfully ſuppoſe, that theſe nerves, as it were Reins put upon theſe blood-carrying Veſſels, do ſometimes dilate, and ſometimes bind them hard together for the determining the motion of the Blood according to the various force of the Paſſions, or to deduce it here and there after a manifold manner; for by this means it comes to paſs, that in fear the excurſion of the blood is hindred, and in other Affections its motion is reſpectively altered.

But that many ſhoots and branches are inſerted into the *Pericardium*, it ſeems to be for this uſe; to wit, that that little Cheſt which is made like a Fort for the defending the Heart from injuries, as often as any troubleſom matter aſſaults or beſieges it, might be able to draw it ſelf together, and to ſhake off the enemy. For it ſeems, that the inordinate tremblings and ſhakings of the Heart, which are manifeſtly different from its natural Pulſe, proceed from the violent ſhaking of this Membrane.

As to the Cardiack branches ſent from this infolding we obſerve, that they, becauſe deſtinated to a publick office, do therefore communicate and enter into the pairs of either ſide before they are inſerted into the Heart; for which end the infolding is made before the Baſis of the Heart, where the aforeſaid ſhoots, from the wandring pair and many others, going out from either intercoſtal nerve, meet together. From that infolding, placed between the *Aorta* and the pneumonick Artery, very many branches being ſent forth above, cover over the Hemiſphere of the Heart: but yet from theſe certain branches, carried under the *Aorta*, are brought into the left ſide of the ſaid Hemiſphere; and as other pairs tend towards the right ſide, one of the firſt of them, making a little handle, binds about the pneumonick Artery; then meeting with other Cardiack ſhoots, makes the leſſer infolding, out of which branches are ſent forth into the right and anterior ſide of the Heart. That from the greater Cardiack infolding, nerves departing one from another, do inſtitute contrary journies towards the Heart, it is indeed, that they might come to divers regions of the Heart without meeting one another, and might affect its Veſſels reſpectively in their paſſage; to wit, the branches carried this way, inſert their ſhoots into the *Aorta*, and from the others going that way, one compaſſes about the pneumonick Artery. The reaſon of both ſeems to be, that the blood might be either ſooner or ſlower drawn from the boſoms of the Heart for its various need or neceſſity. For whilſt the aforeſaid nerves do both ſuſtain its motion by their influx, and alſo moderate and temper it by their inſtinct, it ſo comes to paſs from thence, that thoſe

Veſſels alſo, being affected by the ſame nerves, do further compoſe themſelves to the requiſite Analogies and proportions of the Pulſes.

Indeed there are many Nerves, and thoſe conſpicuous enough, which are inſerted into the Heart, and cover its outward ſubſtance with ſhoots ſent forth from all ſides; yet it is not to be thought, that theſe nerves alone perform and ſuſtain the undiſcontinued motion of the Heart: becauſe ſo ſmall little ropes ſeem too unequal for the perpetual agitation of ſuch a Machine. Yea it may be obſerved, that more ſhoots and fibres of nerves are diſtributed into the little ears of the Heart and the depending Veſſels, than into its frame or ſubſtance. Further, it is obvious to any that will behold it, that there is a greater plenty of nerves deſtinated to the Lungs, Liver, Spleen, Ventricle, or Reins, than to the Heart it ſelf; ſo that ſome Anatomiſts (as *Fallopius* ſays) were doubtful, whether there were any nerves that belonged to the Heart or not. But this being clear enough, that we may deſcribe the motive power of this Clock or Machine ſtirred up by the help of ſome ſmall nerves, as it were an exploſive motion, we ſay that the ſubſtance of the Heart it ſelf conſiſts of a very fibrous fleſh, and may rather be called a Muſcle than *Parenchyma* or congealed ſubſtance: wherefore in this, as in other Muſcles, the implanted and proper fibres cauſe the local motion and conſtant ſhaking; but by the inſerted nerves is only conveyed the inſtinct of the motion or action; for the performing of which office, both fewer Nerves and fewer animal Spirits flowing in through their paſſages, do ſuffice. But indeed we ſuppoſe, that the animal Spirits implanted in the Heart, and abiding within its Fibres, did at firſt flow thither through the nerves, and that by this way their expences or loſs are made up or ſupplied; yet that the animal Spirits, which ſeem to be diſpenſed to the Heart by ſo ſparing an hand, may ſuffice for the actuating this perpetual motion, they receive continually ſubſidiary Forces from the arterious blood. For elſewhere we have ſhewed, that in the Heart, as in the whole muſculous ſtock beſides, a ſulphureous Copula, from the ſuggeſted blood, is joyned to the ſpirituous ſaline Particles of the implanted Spirits; which matter, whilſt the Spirits are agitated, being at length ſtruck off, and as it were exploded (juſt like the rarified and inkindled Particles of Gun-powder) for the effecting the motive endeavour, do blow up or intumifie the Muſcle or the Heart it ſelf; and ſo from the indiſcontinued action of the Heart much of this ſulphureous Copula, which is eaſily ſupplied from the blood, and leſs of the Spirits, which are brought by the paſſage of the nerves, is beſtowed.

And here it may be rightly inquired into, whether the Pulſe of the Heart ſo neceſſarily depends on the influence of the animal Spirits through the Nerves, that it being hindred, the action of the Heart ſhould wholly ceaſe? For the deciſion of this, we once made a tryal of the following Experiment upon a living Dog. The skin about the Throat being cut long-ways, and the Trunk of both the wandring pair being ſeparated apart, we made a very ſtrict Ligature; which being done, the Dog was preſently ſilent, and ſeemed ſtunned, and ſuffered about the Hypochondria convulſive motions, with a great trembling of the Heart. But this affection quickly ceaſing, afterwards he lay without any ſtrength or lively aſpect, as if dying, ſlow and impotent to any motion, and vomiting up any food that was given him: nevertheleſs his life as yet continued, neither was it preſently extinguiſhed after thoſe nerves were wholly cut aſunder; but this Animal lived for many days, and ſo long, till through long faſting, his ſtrength and ſpirits being worn out, he died. The carcaſs being opened, the blood within the Ventricles of the Heart, and the Veſſels on every ſide reaching from thence, to wit, both the Veins and Arteries, being greatly coagulated, was gathered into clotters; to wit, for this cauſe, becauſe the blood, though for the ſuſtaining of life, it was in ſome meaſure circulated, yet for the moſt part it ſtagnated both in the Heart, and in the Veſſels. The cauſe of which ſtagnation I can aſſign to no other thing, than that the *Præcordia*, the influence of the animal Spirits being hindred, wanted its uſual motions.

If it ſhould be further demanded, from whence the animal Spirits (the paſſage of both the wandring pair being ſhut up) ſhould be ſupplied to the Heart continuing ſtill its motion; I ſay, that this may be done by the returning Nerves, as from the knots of which many Cardiack ſhoots and fibres proceed; and beſides, the end of either nerve meeting with the nerve ſent from the upper infolding, is united. But we ſhewed already, that the animal Spirits may be carried either this way or that way within the paſſages of the nerves; wherefore when the neceſſity of life urges, the proviſion of the Spirits, though leſſer, being ſent from the aforeſaid infolding, is

received

received by the tail of the returning nerve, and from thence by a retrograde paſſage it was derived into the Cardiack branches, and at length into the Heart it ſelf. Further, there lyes open alſo another paſſage, and that perhaps more obvious, through the paſſage of the intercoſtal nerve: by this way in a man, as well as by the paſſage of the wandring pair, the Spirits are conveyed from the Brain to the *Præcordia*; yea alſo in Brutes a branch is carried into the Trunk of the wandring pair from the intercoſtal infolding; ſo that by this by-path ſome little rills of the animal Spirits (if by chance their influence ſhould be hindred through their wonted chanels) might be carried to the Heart. However that Experiment ſeems to conclude, that the motion of the Heart depends no leſs upon the inflowing of the blood, than upon that of the animal Spirit: the total privation of either takes away life; an Eclipſe of the Spirits wholly takes away from the Heart its motive power; and by the defect of the blood (foraſmuch as the ſulphureous Copula is denied to the Spirit implanted in the Heart) the vigour and elaſtick force of the Heart is ſuppreſt, ſo that the Pulſe being by degrees weakened, life is by little and little extinguiſhed. Without doubt, in the finding out the tenour of the Pulſe, we ought always to mind what the alteration of the animal Spirits, and what the fault of the blood may bring to it.

There is yet another conſideration concerning the Nerves reaching from the Trunk of the wandring pair to the Heart, to wit, that by their paſſage, not only the ſolemn influence and ſtate of the Spirits, for the equally performing of the vital Function, is conveyed; but alſo the inſtinct of every irregular motion, ſtirred up in the *Præcordia* by the force of the Paſſions, is in ſome meaſure transferred this way. I ſay, as to theſe, we ought to diſcourſe and to ſhew by what means, as often as the impreſſion of any Affection exerciſes the Imagination, or rather the Appetite, preſently the *Præcordia* are diſturbed by the paſſage of the Nerves, and by reaſon of their various Affections the motion of the blood is diverſly altered. But becauſe in a man the irregular and extraordinary motions of the *Præcordia* depend on the intercoſtal Nerve as much as and perhaps more than on the wandring pair; therefore we think good to defer this Speculation till the Theory of that Nerve is propoſed. In the mean time, we will proceed to the other branches of the wandring pair; and what next follows, we will inquire into the offices and uſes of the returning Nerves.

The returning Nerve in the left ſide, going away from the wandring pair below the aforeſaid infolding, and ſent towards the *Aorta*, is reflected or turned back about its deſcending Trunk, from whence being carried upwards, it imparts ſhoots to the Muſcles of the *Trachea* and the *Larynx* ſent forth by a long tract from either ſide of the Nerve; then its top or height is united with a ſhoot meeting it out of the Ganglioform infolding, *Fig.* 9. *n.* **** *b*. But the returning Nerve on the right ſide is reflected much higher about the axillar Artery, to wit, proceeding from the lower infolding of the wandring pair, and after the ſame manner is beſtowed on the other ſide of the *Trachea*, *Fig.* 9. *L*. But either returning back about the knots of reflection, ſends forth towards the Heart very many ſhoots and fibres, which are inſerted into its little ears, the appending Veſſels or its Infoldings.

What the chief uſe of this Nerve is, we have already ſhewn; to wit, being rolled about on both ſides the Artery, as it were a Windlace, it cauſes the little rings of the *Trachea* or Weaſand to be drawn hither and thither, like the folds of a pair of Bellows, both for breathing and making a ſound. But indeed either Nerve, foraſmuch as it being reflected about the Artery, is carried upward into the part to be moved, doth move downwards the little rings of the *Trachea* or Wind-pipe by certain ſhoots of it; alſo foraſmuch as either is terminated in the Nerve, ſent from the Ganglioform infolding, it carries upwards the folds of the *Trachea* by other ſhoots of it. Hence a reaſon may be given, why the returning Nerves being cut off, every Animal is preſently dumb; to wit, becauſe, unleſs the *Trachea* be moved, the breath being blown out, paſſing without any refraction through its cavity, as it were through a Pipe alike hollow in its whole paſſage, gives no ſound.

Concerning theſe Nerves we ought to inquire, what is the reaſon of the difference, that the knots of reflection are not alike on both ſides; alſo for what end the Cardiack branches proceed from both knots. As to the firſt, that the left returning Nerve, not as its pair, binds about the axillary Artery, ſome reaſon ſeems to be, becauſe the left axillary Artery, ariſing below, is carried as the right, by a bending, and not a ſtraight paſſage, into the Arm; wherefore the little cord of the Nerve, compaſſing about its Trunk, hath no fixed, but a very moveable knot of reflection,

for that it might eaſily ſlide from its place. But it may rather be ſaid, that it is for other uſes, and thoſe more neceſſary, that theſe Nerves compaſs about thoſe Veſſels after that manner. For when they, as it were Reins or Bridles caſt on the blood-carrying Veſſels, by pulling them hither and thither, variouſly determine the courſe of the blood, it ſeems to be required, that one returning Nerve ſhould bind together or conſtringe the axillary Artery, and the other the deſcending Trunk of the *Aorta*: for as often as there is need for the blood to flow forwards towards the Head more plentifully, the returning Nerves perform it eaſily, by pulling upwards the aforeſaid Arteries: But the blood, after a ſort, ought to be continually urged into the higher parts, leſt otherwiſe by its weight it ſhould turn too much downwards; wherefore in all Expiration or breathing forth, when the *Trachea*, drawing nearer together its folds, is contracted upwards, the blood about to deſcend through the *Aorta*, is ſnatched upwards by one tract of the nervous little cord, and in like manner, the axillary Artery in the right ſide being ſhaken with it, the blood flowing in the whole aſcending Trunk of the *Aorta*, is driven upwards a little ſwifter.

But beſides this continual and equal ſnatching up of the blood towards the upper parts, it is ſometimes occaſionally urged towards the Head by a more intenſe and quick motion of the *Trachea*, and alſo by a more full and ſwift courſe. For as often as any Animal grows angry, the voice preſently ſhews ſigns of ſuch an Affection, and oftentimes by chiding, they make it ſharp; as men, when they are angry, chide or brawl, and Dogs bark: Now from ſuch an intenſion of the voice and chiding, as the upper rings of the *Trachea*, a reciprocation being there made, are often ſtruck together; ſo the blood alſo (the *Aorta* being ſtrongly drawn) is urged upwards by a copious afflux, ſo that it preſently dyes the countenance and eyes of angry people with a redneſs, and induces to the Brain it ſelf a greater heat and provocatives to anger, and a greater glowing or infiring to the Spirits by ſtirring them up. For the ſame reaſon, in Joy and Gladneſs, foraſmuch as the *Trachea* is exerciſed by ſinging or laughing, the blood alſo is poured out more plentifully towards the exterior, and eſpecially the upper parts.

And from hence the cauſe is plain, wherefore either returning Nerve ſends forth Cardiack branches from the knot of reflection or turning back; to wit, that in thoſe kind of affections, the notice of which the *Trachea* in ſounds or voices gives by the help of the Nerves, the Heart it ſelf by its means alſo might be affected. For ſo, as often as we wrangle or brawl, the Heart being irritated, preſently inkindles the blood more, and drives it forward more plentifully, as food for thoſe Affections, towards the Brain. Alſo in laughter, great rejoycing, or ſinging, by the paſſage of thoſe Nerves, the Heart being brought into a conſent or Sympathy, or joynt action, preſently explodes or drives out the blood by a ſwifter pulſe, and caſts it haſtily out, which otherwiſe would be heavy and troubleſom by a ſlower motion or ſtagnation; wherefore thoſe ſort of actions, to wit, laughing and ſinging, are ſaid to alleviate the Heart, becauſe they make the blood more freely and readily to be poured out of the boſoms of the Heart, and alſo, by the ſupplying help of the Lungs, to be emptied into the ſame.

Below the production of the left returning Nerve another noted Nerve is carried towards the hindermoſt region of the Heart, which being carried with a certain compaſs about its Baſis, ſends forth frequent ſhoots, which cover the left ſide of the hinder Hemiſphere, *Fig.* 9. *o.* Then this branch meeting with another pair ſent from the oppoſite ſide towards the Heart, and diſtributing ſhoots into the right ſide of the hinder Hemiſphere, is united with it, *Fig.* 9. *q.*

This Cardiack branch, deſtinated to the hinder region of the Heart, is produced apart below the reſt, that it might be carried by it ſelf to its Province without the meeting with or implication of others; the pairs are ingraffed on either ſide, that they might accompany one another, and be together drawn in the ſame action of the Heart. It appears not plain, whether theſe nerves conſpire with the other Cardiack nerves, ariſing above, reaching forth to the anterior Hemiſphere of the Heart; or whether this pair effect not the *Syſtole* of the Heart, and the upper its *Diaſtole*. However it is, certain ſhoots of the kindred or ſtock of either, being ingraffed with others of another ſtock, communicate one with the other.

The Trunk of the wandring pair ſends forth on both ſides very many noted branches from the region of the Heart, which are ſpread on every ſide into all the Lobes of the Lungs, the *Bronchia* of the *Trachea*, and the Coat of the *Oeſophagus* hard by deſcending,

deſcending, *Fig.* 9. *s.s.s.* Thoſe which go into the Lungs paſs every where through their whole ſubſtance, following the ramifications of the Veins and Arteries, and the Pipes of the *Bronchia*, which chanels of blood and air they variouſly climb over, and bind about through their whole tract.

When that ſo many noted branchings of the Nerves are beſtowed on the Lungs, it is a wonder, that by ſome they ſhould be thought to be inſenſible and immoveable of themſelves. Yea it is doubted by many, whether theſe Bowels do cauſe the motions of the *Syſtole* and *Diaſtole* of themſelves by their own endeavour. For that it is a received Opinion, That this reciprocation of the Lungs doth proceed wholly from the motion of the *Thorax*, and doth obey or obſerve its dilatation or conſtriction with a certain neceſſary dependency; *viz.* that the Breaſt being dilated or ſpread open after the manner of a pair of Bellows doth compel the ambient Air into the *Trachea*, which ruſhing into the Lungs, blows up and diſtends them; then the ſame Breaſt ſubſiding or ſinking of it ſelf, that the Lungs being preſſed together with the weight of it, do breath forth the Air before intruded. In truth, however that I might judge, that the *Diaphragma* and the Muſcles of the Breaſt do conduce much to Reſpiration; yet that theſe parts ſhould perform this office alone, and that the Lungs are meerly paſſive, I cannot grant. For Reſpiration is chiefly inſtituted for the ſake of the blood and the Heart, and its act is wont to be determined according to the various diſpoſition of theſe, and to be altered every minute of an hour almoſt according to the manifold neceſſity of the Pulſe. But indeed the Lungs themſelves are they (and not the *Diaphragma* or the Muſcles of the *Thorax*) which the blood, boiling out of the Heart, paſſes through, and continually affects according to its temper, and the tenour of the Pulſe: wherefore from hence it may be concluded, That the Lungs themſelves do conceive the firſt inſtincts of their motions, and by the help of the aforeſaid Nerves, do in ſome meaſure exerciſe themſelves, and endeavour the *Syſtole* and *Diaſtole*, and deſign them according to the ſenſe of its proper neceſſity; but when in theſe, Fibres requiſite for local motion are wanting, therefore the *Diaphragma* and the Muſcles of the *Thorax* help continually the endeavours of the Lungs, and by the cooperation of theſe, compleat breathing is effected. And ſo when Nerves of a twofold kind, to wit, ſome from the Spine being inſerted into the Muſcles of the *Diaphragma* and the *Thorax*, and others from the wandring pair diſtributed into the Lungs, actuate the Organs of Reſpiration; for that reaſon it comes to paſs, that the act it ſelf of Reſpiration, of it ſelf unforced and involuntary, may be at our pleaſure ſomewhat reſtrained, interrupted, and diverſly altered. The *Sympraxis* or joynt action of the Nerves of either kind, in the work of Reſpiration, ſhall be ſhewed hereafter, when we ſhall ſpeak particularly of the Nerve of the *Diaphragma*.

It yet appears more plain, that the Lungs are oftentimes the chief in the act of Reſpiration, becauſe they being irritated from ſtrange and improportionate objects, preſently conceive irregular and violent motions; as when a vehement Cough is ſtirred up for the excluſion of any troubleſom thing; to which motion the *Diaphragma* and the Muſcles of the *Thorax* preſently obey. In like manner, in difficult and ſighing breathing, or any other ways unequal, its firſt inſtinct for the moſt part is begun by the Lungs; yet ſometimes when the exterior Organs of Reſpiration are excited into irregular motions, the Lungs alſo are compelled to follow their irregularities; ſo when the *Diaphragma* after a manner begins laughter, the Lungs perform the ſame with a following cackling ſound: ſo all the Organs of Reſpiration intimately conſpire and agree among themſelves, that although one of them do a thing inordinately, rather than there ſhall be a Schiſm, the reſt do imitate or follow its irregularity.

But that the Nerves, following the Arteries and Veins through the whole frame of the Lungs, do variouſly bind about and cloath their Trunks with a thick ſeries of ſhoots, the reaſon ſeems to be, both that the Coats of the Veſſels being gifted with a conſtant influx of animal Spirits, might imitate the motion of the Heart; and by that means, by a continual pulſation of the Arteries and the conſtriction of the Veins, they might eaſily carry the blood in this its more ſhort luſtration through the Lungs; and the rather, that the pneumonick Veſſels, being bound about with ſuch Reins of Nerves, might moderate the courſe of the blood according to the forces and inſtincts of the Paſſions. For whenas the exterior circulation of the blood depends upon this interior; as the blood is commanded to paſs ſooner or ſlower through the Lungs,

Lungs, or to ſtay there and be hindred, the excurſion and return of it alſo from or towards the Heart is wholly performed. In Joy or Anger, becauſe the Lungs rapidly transfer the blood out of one boſom of the Heart to the other; therefore its ſwifter and more plentiful flowing out into the outward parts, follows. In like manner, in Fear and Sadneſs, for that the Lungs (its Veſſels being ſtrained together) deliver the blood to the Heart by the Veins, and do not then preſently carry it back by the Arteries, the outmoſt region of the Body is deſtitute of its due influx. Notwithſtanding theſe kind of pathetick ſnatches of the blood are in ſome meaſure performed, becauſe its Veſſels are bound about in other places in like manner with the Nerves. If at any time Spaſmodick Affections ſhould afflict the pneumonick Nerves from a morbific cauſe, ſo that being twitcht with inordinate motions, they ſhould pull or draw together here and there the Arteries and Veins which they embrace; for that cauſe, the blood either too much flowing out of the Lungs, makes them to flag, and to fall together into themſelves, ſo that drawing to them copiouſly the Air, they do not eaſily render it back again; or, which frequently happens, the blood being detained within the Lungs, and there ſtagnating, ſtuffs them up, and holds them a long while ſtiff, that they cannot inſpire or drawn in the Air. The Symptoms of either kind ordinarily happen in the Hyſterick diſtempers, and in ſome Hypochondriacal. Yea ſometimes the *Bronchia* themſelves are pulled together by the like Convulſion of the Nerves, and are hindred in their motion, ſo that they cannot take in and ſend forth the Air after its due manner, as may be ſeen in Aſthmatical Fits. The diſtempers of which ſort are oftentimes produced by the fault of the Nerves, without any implanted Dyſcraſie or evil diſpoſition of the Lungs. I have ſometimes obſerved ſome Caſes of ſick people, in which, when at one time the morbifick matter beſieging the Brain, had induced Lethargick or Vertiginous Symptoms, a little after the ſame matter occupying or poſſeſſing the origines or middle proceſſes of the nerves belonging to the Lungs, has ſuddenly excited a moſt horrid Aſthma without any previous Cough or Catarrh.

But that out of the ſame tract of the wandring pair many ſhoots are diſtributed into the Lungs, and alſo many others into the Coats of the *Oeſophagus*; from hence a reaſon may be given, why a troubleſom Cough oftentimes cauſes Vomiting and a ſubverſion of the Ventricle; why alſo on the other ſide a perturbation of the Ventricle ſo frequently induces a troubleſom endeavour of Coughing. I have known in Hypochondriacks, that aliments of ill digeſtion, taken into the Stomach, have preſently excited a vain and very pertinacious Cough; in the mean time, that the Lungs were free from any conſumptive diſpoſition. The cauſe of either diſtemper ſeems to be, that when the nerves, diſſeminated in either part, are taken with a Convulſion, oftentimes thoſe which are of the other part, are drawn into a conſent of the ſame diſtemper. Perhaps from hence it happens, that ſometimes an Aſthma is induced by reaſon of the evil of the Ventricle, and that that diſtemper (as *Riverius* obſerves) is often wont to be cured by an emetick Medicine.

After ſo many branches and ſhoots have been ſent from both ſides the wandring pair, at length its Trunk is divided below the Lungs into two branches, *viz.* the exterior and interior; either of which inclining towards the pair of branches on the other ſide, are united to them, and after a mutual communication they conſtitute the two Stomachical branches, *viz.* the ſuperior and the inferior, *Fig.* 9. *t. u. w. x.*

It is worth obſerving, with what wonderful artifice either Trunk of the wandring pair do communicate one with the other with two branches, as it were two hands meeting one the other, that the influence of either nerve might equally reach to every region and part of the Stomach. For whenas either Stomachical branch, to wit, both the upper and the lower, is carried together from the two branches coming out from either ſide of the wandring pair; it is provided, that the Tributes of the Spirits deſtinated to the Ventricle, ſhould be at once certain and very plentiful. For what appertains to the performing the action of this Bowel or Chylification, the Spirits flowing in from either ſide, are abundantly diſtributed into the Orifice, and from thence into all its parts and private places; and by that means it comes to paſs, that the Stomach diſſolves bodies beyond the force of any Chymical Menſtruum. Then beſides, as to the feeling or ſenſe of the Ventricle, or the affection of it from things ingeſted; it is carried alſo towards the Head by a double way (whereby the paſſage may be the more certain) to wit, by either Trunk of the wandring pair; that for that reaſon being indued with a moſt exquiſite ſenſe, it might not be deceived concerning

cerning its objects; and if that any thing inimical or contrary to it, ſhould lye hid among what is eaten, it might diſcern it and thruſt it out of its own accord, or at leaſt by the knowledge only of the Cerebel.

That from the ſame double Trunk of the wandring pair, from whence the Cardiack Nerves ariſe a little above, the Stomachical branches alſo proceed, the cauſe is plain wherefore the Heart it ſelf hath ſuch a Sympathy with the Stomach, ſo that its *Deliquium* or Swooning follows upon any great pulling or hawling of this.

Either Nerve of the wandring pair is terminated in the Ventricle it ſelf: for after the eighth Conjugation hath made as it were an high road for the paſſage of the animal Spirits to the *Præcordia* and to this noble Bowel, it puts a bound to it ſelf; nor indeed does it ſeem meet to have its branches ſtretched out any further to the *Viſcera* of the lower Belly: becauſe it ſeems an unworthy thing, that the ſame path which leads to the chief office of nutrition and to the Palaces of life it ſelf, ſhould lye open to the more vile Inteſtines alſo, and the ſink of the whole Body. And truly, although the ample path and broad way of the wandring pair is not produced beyond the Ventricle, yet becauſe a frequent commerce happens between this and the *Præcordia* and the other inferior parts; therefore between the Stomach and the other Bowels, though of a more baſe uſe, certain Fibres, as it were ſmaller paths, are reached forth, in which, at leaſt little bands of Spirits, like Diſcoverers or Meſſengers, run to and fro.

CHAP. XXV.

A Deſcription of the Intercoſtal Nerve.

AFter the unfolding of the Nerve reaching forth to the *Præcordia* and the Ventricle, we are led by the ſeries or order of the inward parts to the deſcribing a Nerve akin to this, and which reaches forth its branches to the furthermoſt Province, to wit, to all the *Viſcera* or Inwards of the lower Belly contained below the Ventricle. This is commonly called the Intercoſtal, becauſe that going near the roots of the Ribs, it receives in every one of their Interſtices a branch from the ſpinal Marrow. Its beginning is not yet ſufficiently detected; for by moſt Anatomiſts it is wrongfully taken for a branch of the wandring pair, though indeed the wandring and the intercoſtal pair do communicate among themſelves by branches ſent forth one to the other; yet as to both their beginnings, Trunks and wandrings up and down, they are plainly diſtinguiſhed. If that this latter Conjugation, being denied the title of a peculiar nerve, ought to confeſs it ſelf of another ſtock, certainly it owes nothing to the wandring pair, but ſhould borrow its original from the Nerves of the fifth and ſixth pairs; for two or three ſhoots being ſent back from thoſe nerves going out towards the Eyes and Face, go into the ſame ſtock or Trunk, which is the Trunk of the intercoſtal nerve, as we have intimated before.

The intercoſtal Nerve being conſtituted after that manner, and going out of the Skull at a proper hole, preſently contains the Ganglioform infolding, near to another the like infolding of the wandring pair; into which two nervous Proceſſes are carried from the laſt pair within the Skull, or the firſt Vertebral. From that infolding one ſhoot is ſent forth into the Sphincter of the Throat, and another noted one into the Ganglioform infolding of the wandring pair. Then this nerve deſcending towards the *Vertebræ*, hath in the middle of the Neck another far greater infolding, into which an ample nerve, from the neighbouring Vertebral pair, is inſerted; but from the ſame many nerves, which reſpect the *Præcordia*, are diſtributed on every ſide: For two or three ſhoots are ſent forth into the nerve of the *Diaphragma*, and one ſhoot into the returning nerve; beſides, numerous fibres and ſhoots are carried both into the returning nerve, and towards the *Trachea*, which are inſerted into its Coats, and into thoſe of the *Oeſophagus*, and into the blood-carrying Veſſels. Further, one branch deſcends into the Trunk of the wandring pair, and two noted nerves into the Cardiack infolding; then a little lower another nerve by it ſelf, proceeding out of the intercoſtal Trunk, is inſerted alſo into the Cardiack infolding: which noted branches ſent down on both ſides from the intercoſtal nerve, for that they joyn

together

together with others derived from either Trunk of the wandring pair, make the Cardiack infolding it ſelf. But theſe Cardiack branches from the intercoſtal nerve, as alſo the Cervical infolding, or that in the hinder part of the Neck, whence they proceed, are peculiar to men, and are wholly wanting in brute beaſts.

The intercoſtal Trunk deſcends from the cervical infolding towards the chanel-bone, where being about to enter the cavity of the Breaſt, it falls upon the axillary Artery, as it were in right Angles, and ſtrains or binds it; from whence it is drowned or hidden in the *Thorax* near the roots of the firſt and ſecond Ribs; and there receiving three or four branches from the Vertebral nerves next to thoſe uppermoſt, conſtitutes another infolding, which is commonly called the Intercoſtal infolding. The uppermoſt of theſe Vertebral nerves coming to this infolding in its journey binds the Vertebral Artery, and almoſt compaſſes it about. In Brutes by this nerve which comes upon the Vertebral Artery, the intercoſtal infolding communicates with the root of the nerve of the *Diaphragma*, and not by any other means, unleſs by ſmall fibres ſent forth from the lower part of the infolding into the Vertebral nerves. Further, in Brutes a noted branch is carried from this infolding into the Trunk of the wandring pair. But in Man the intercoſtal Trunk paſſes through the cavity of the *Thorax* without any communication had with the other parts; unleſs that from hence in its whole deſcent, running near the roots of the Ribs, it admits in every one of their interſpaces, and from thence even to the *Os ſacrum* from between the knots of the *Vertebræ*, a Vertebral branch.

The intercoſtal pair ſends forth a noted branch on either ſide, where having gone through the cavity of the *Thorax* or Breaſt, it comes over againſt the bottom of the Ventricle, which tending towards the *Meſentery*, conſtitutes the chief infoldings of it. But there are ſeven Meſenterick infoldings, *viz.* five great ſuperior, and two leſs inferior: out of all which, numerous ſhoots and fibres are ſent forth together into the parts which they reſpect, and into the neighbouring infoldings. The Meſenterick nerves, which are carried into theſe infoldings, and the infoldings themſelves, and alſo the fibres and ſhoots, which flow out from them on every ſide, like rays of light, are diſpoſed according to the following manner both in Man and in the more perfect Brutes.

The Meſenterick branch therefore in the left ſide going from the intercoſtal Nerve, and bending downwards, is parted into two noted ſhoots: the greater of theſe bending back upwards towards the Stomach, diffuſeth it ſelf preſently into an infolding, as a narrow rivulet into a ſpacious Pool. From this infolding numerous fibres and ſhoots go forth as it were in four bands. The firſt of theſe, and which is the greateſt bundle of its fibres, being carried into the Ventricle, is beſtowed partly in the bottom of it, and partly theſe fibres are met, and ingraffed with others ſent from the Stomachical branch. The other maniple or band of nervous Fibres goes forth from this infolding to the Spleen, where the nerves accompanying the ſanguiferous Veſſels, and variouſly binding them about, are diſperſed into the more inward frame or ſubſtance of the Spleen; yet out of which going towards the Spleen, ſome ſhoots following the ſhort Veſſels, are carried into the Stomach. The third Company of nervous Fibres is inſerted between this infolding and the Hepatick or that belonging to the Liver, placed in the right ſide over againſt it. Laſtly, the fourth Conjugation of Fibres knits together this and the greateſt infolding of the Meſentery lying under it.

The lower ſhoot of the Meſenterick branch, which is on the left ſide, increaſes into an infolding, to which the next Vertebral branch, deſtinated to the intercoſtal Nerve, is carried. From this infolding the chief bundle of nervous Fibres is carried into the left Kidney, and before the Fibres enter the Reins, they bind and variouſly compaſs about the emulgent Veſſels. Further, between this infolding and the greateſt of the Meſentery many Fibres are ſtretched out; from hence alſo many ſhoots are diſtributed into the atrabilary Cheſt, or the Receptacle of the Spleens excrements.

In the right ſide the Meſenterick branch being ſent from the intercoſtal Trunk, and being in like manner twofold, contains in its upper ſhoot the Hepatick infolding; out of which the greateſt bundle of nervous Fibres is carried towards the Liver; numerous ſhoots of which accompanying the blood-carrying Veſſels, greatly beſet, and as it were cloath with a little net the Trunk of the Hepatick Artery: which fibres and ſhoots, being carried higher, are diſtributed into the Liver, the Gall-cheſt or bag, the paſſage of the Gall, the Pylorus, and the Pancreas. Further, many Fibres, which are of this Conjugation, meet with Fibres ſent from either Stomachical nerve, and

are

are ingraffed into them. Another handful of nervous Fibres is ſtretched out between this infolding and the oppoſite infolding belonging to the Spleen, and another between this and the greateſt infolding of the Meſentery; yea, there is ſome communication had between this and that belonging to the Kidney lying under the ſame ſide by a large ſhoot ſent down.

The lower ſhoot of the right Meſenterick branch, like as it is in the oppoſite ſide, contains a ſufficiently noted infolding nigh the atrabilary Cheſt; to which preſently the intercoſtal Nerve imparts its Vertebral branch received below. From this infolding the chief bundle of nervous Fibres deſtinated to the Reins, embraces the blood-carrying Veſſels in like manner as in the oppoſite ſide; alſo many fibres and ſhoots are ſtretched out from this infolding to thoſe near, *viz.* the Hepatick and the greateſt of the Meſentery; yea, certain Fibres are diſperſed from the ſame into the atrabilary Cheſt.

After this manner either Meſenterick branch being carried from the Intercoſtal pair, and being preſently twofold, immediately conſtitutes two infoldings in either ſide. In the midſt of theſe the greateſt infolding of all ſtands like the Sun in the midſt of the Planets; from which numerous ſhoots and fibres are diſperſed into all the parts of the Meſentery; which indeed following the blood-carrying Veſſels in their whole proceſs, climb over and bind about the ſame. Moreover, between this infolding and every one of the four aforeſaid is produced a peculiar little bundle of Fibres. Beſides, in the female Sex, from hence ſome ſhoots are carried into the Glandula's of the Womb, commonly called the Stones. But from the Meſenterick branches, which conſtitute the former infoldings, no noted branches, but only little ſhoots, are ſent into this infolding. Yea the chief Nerve which is inſerted to this, and ſeems to be the primary for the conveying of plenty of Spirits into it, and a broad way, is carried from a certain ſmall infolding far lower nigh the ſtraight Inteſtine; which infolding, together with the other neighbouring one, that we call the leſſer infoldings of the Meſentery, ſhall be deſcribed preſently. In the mean time, that we may proceed to them in order, we will follow the paſſage of the intercoſtal Nerve.

Below the Meſenterick branches, from which the aforeſaid ſuperior infoldings are conſtituted, the intercoſtal Trunk deſcends between the Muſcles of the Loyns, and beſtows every Vertebral branch, admitted in its deſcent, upon ſome internal parts.

For the Vertebral branch brought to the intercoſtal Trunk nigh both Kidneys, is carried into the Womens Teſticles, then ſome following into the Ureters. From the Region of the twenty ſeventh *Vertebra* one Vertebral branch and two others, going from the intercoſtal Trunk, tend towards the ſtraight Inteſtine, and there they meet with three pairs ſent from the other ſide; all which being united, conſtitute the infolding, which is the loweſt of the Abdomen. From this infolding a noted Nerve, being carried upwards, is brought into the greateſt infolding of the Meſentery, which in its journey receives one and then another ſhoot ſent down on both ſides from the intercoſtal Nerve; and there, near its bounds, diſtributes ſome ſhoots into the Glandula's of the Womb.

But from the loweſt aforeſaid Infolding, a Nerve going towards the upper Infoldings, about the ſpace of an inch, conſtitutes another leſſer infolding in the neighbourhood; out of which one Nerve tends upwards, and another oppoſite ſtraight downwards. The former of theſe is carried into the greateſt infolding of the Meſentery, and in its whole paſſage ſtretches under the ſtraight Inteſtine, and part of the *Colon*, and inſerts into them many ſmall ſhoots. But the other Nerve deſcending from this infolding towards the *Anus* under the inferior part of the ſtraight Inteſtine, imparts to it alſo frequent ſhoots; ſo that this infolding, the leaſt of all thoſe which are within the Abdomen, ſeems to be conſtituted for the ſake of this Nerve only, to wit, which lying under the ſtraight Inteſtine and part of the *Colon*, is inſerted into the greateſt infolding of the Meſentery.

From the loweſt neighbouring Infolding, to which this leaſt owes its original, two Nerves going out, and being ſent down into the *Pelvis*, cauſe there two infoldings, *viz.* one in either ſide, in which the Nerves coming from the *Os ſacrum*, and ingraffed with the former, meet; from which alſo the Nerves diſtributed into the adjacent parts, ſerve unto the ſeveral Excretions, *viz.* of the Urine, Dung, and Seed made in that place: for two Nerves enter into the end of the ſtraight Inteſtine, and as many into the Womb or Proſtates; but one, and that a noted one, is carried into the Bladder.

But that we may return to the Intercoſtal pair, after either Trunk of it had ſent forth three branches, out of which the aforeſaid lower infoldings of the *Abdomen* are mediately or immediately made, it deſcends ſtraight towards the *Os ſacrum*, and in its journey ſends forth yet one or two branches into the Ureters: but as ſoon as it is come to the beginning of the *Os ſacrum*, both nerves mutually inclining themſelves to one another, are demerged within the bending of the ſame bone, and there nigh its declining, and then in its deſcent, they ſeem to be knit together upon it by two or three proceſſes; and ſo at length either nerve ends in very ſmall fibres, which are diſtributed into the Sphincter of the *Anus*. But ſometimes either nerve joyn together into a round infolding nigh one tranſverſe proceſs, out of which ſingle infolding the like very ſmall Fibres are produced. Further, many others from the laſt Vertebral Nerve meet with, and are ingraffed with theſe Fibres from the intercoſtal pair inſerted into the *Anus*.

CHAP. XXVI.

The Explication of the Intercoſtal Pair of Nerves which are deſcribed in the former Chapter as to their Offices and Uſes: and firſt the upper Branching of them is conſidered.

THE beginning of the Intercoſtal Nerve are two or three ſhoots reflected or turned back from the Nerves of the fifth and ſixth pair, and united into the ſame Trunk, *Fig.* 9. *D. a. a. b.* Here we may wonder at the birth of this Nerve, as it were borrowed; for it grows as a ſhrub upon another tree or ſhrub; and therefore diſpenſes the common virtues and influences of either with a double branching, *viz.* both its own and that of its parent: by which ramification or branching it comes to paſs, that there are very quick commerces and conſent between the conceptions of the Brain and the affections of the *Præcordia*, alſo between the Actions and Paſſions almoſt of all the parts of the whole Body, which belong to the involuntary Function. For in that the Trunk of the intercoſtal Nerve proceeds from the Nerves of the fifth and ſixth pair nigh their beginnings, that is a ſign that both the influence of the animal Spirits, and the inſtincts for the performing of motions, are derived chiefly into it from the Cerebel; to wit, from whoſe annular proceſs the aforeſaid pairs of Nerves ariſe. But foraſmuch as the ſame intercoſtal Nerve is rooted in their Trunks, and not immediately in the Cerebel; this is the reaſon why the Eyes, as alſo the parts of the Mouth and Face, to which the fifth and ſixth pairs have regard, do anſwer ſo readily and unknown to the Cerebel, as it were by the ſame act, to the motions of the *Præcordia* and *Viſcera*, which the intercoſtal Nerve effects; and on the contrary, the motions of theſe preſently follow the action of thoſe. As for example, in Sneezing as ſoon as the nervous Fibres beſmearing the Noſtrils, are wrinkled together by the pulling, preſently by the paſſage of the intercoſtal nerve the Diaphragma, by reaſon of a more deep inſpiration or drawing in the breath, is for ſome time depreſſed; then the Cramp of the Noſtrils remitting, the Midriff alſo being violently drawn back, cauſes a more ſtrong breathing forth with a vehement blowing of the Air. In like manner on the contrary, when by a tickling made upon the Ribs, the Diaphragma being affected with a Spaſm, moves to a cackling noiſe, the Face and Mouth are pathetically figured with it into laughter.

The intercoſtal Nerve being ſlid out of the Skull, preſently conſtitutes the Ganglioform infolding, *Fig.* 9. *G.* it being after the ſame manner in the Trunk of the wandring pair. What the uſe of theſe infoldings is in general, we have already ſhewn; and clearly for the ſame reaſon in this place in the intercoſtal Trunk, where it receives into it ſelf ſome nerves from elſewhere, and ſends forth others from it ſelf into the neighbouring parts, this infolding, as it were a knot in the ſtem of a flouriſhing Tree, is made, that it may be as it were a diverting place for the manifold tendency of the Spirits. As to the adventitious Nerves it is obſerved, That by them plenty of ſubſidiary Spirits are tranſmitted hither, only from the ſpinal Marrow, but by a manifold and frequent paſſage; wherefore in this infolding, and again in the.

the following, then a little lower, nigh the ſeveral junctures of the *Vertebræ*, the Vertebral branch comes to either Trunk of the intercoſtal pair: this ſeems to be ſo conſtituted for many uſes. Firſt, That the intercoſtal Nerve, by the reiterated faſtening to the ſolid parts, as it were by a frequent ſtay, might become the more firm for the making of a long journey, when otherwiſe its little rope, by too much ſtretching out, might be eaſily broken. Secondly, By this means it comes to paſs, that the nerves which are the Executors of the ſpontaneous, and thoſe of the involuntary Function, might have both a more certain commerce together, and might be ſometimes excited into mutual ſuccors. Hence Reſpiration and ſome other Acts, eſpecially what concerns the Act of *Venus*, participate of either Regiment, ſo that ſometimes they follow the will, and ſometimes draw it even by force or unwilling. Further, when at any time the ſtock of animal Spirits is deficient in either Province, ſupplies of them are ſought from the other: to wit, (as we hinted above) if the influence towards the *Præcordia* be ſhut up through the ordinary paſſages, *viz.* the internal nerves, their paſſages requiſite for the ſuſtaining of life, might be ſupplied by the Vertebral branches: yea it is probable in the partial *Apoplexie*, and in the *Incubus* or Night-mare, when the Cerebel being affected, the Spirits deſtinated for the Heart, ſuffer an Eclipſe in the Fountain it ſelf, that through theſe Emiſſaries, to wit, the Vertebral branches inſerted into the intercoſtal pair, ſome extemporary Subſidies are carried for the actuating the Heart. Thirdly, The Vertebral branches by ſo frequent an inſertion, are added to the intercoſtal nerve, perchance in ſome reſpect for this end alſo, that the ſuperfluous or excrementitious humidities, heaped together about the ſpinal Marrow, might be ſent away by theſe Proceſſes: for indeed we have already ſhewn, that a certain humor doth abound within the Head, the medullar Appendix, and nervous Syſtem; which oftentimes (when it becomes watry, or abounds above meaſure) begets a ſerous heap in thoſe parts: wherefore when the branches of the intercoſtal nerve are terminated into the Meſentery, Kidneys, Inteſtines, and ſome Genital parts, it is probable they do transfer into theſe ſinks ſuperfluous humidities, not only their own, but alſo of another ſort, to wit, thoſe received from the ſpinal Nerves.

As to the Nerves, which as Emiſſaries, are carried from the aforeſaid Ganglioform infolding into other parts, we obſerve; firſt, that a noted ſhoot is carried from hence into the Sphincter of the Throat, *Fig.* 9. γ. This nerve in the Sphincter of the Throat correſponds with others akin; ariſing higher from the fifth pair, and diſtributed into the parts of the Palate and Mouth, and is helpful to them in the buſineſs of chewing: for when the maxillar branches of the fifth pair ſhould perform their work for the chewing of the food taken in, the task of this nerve mediately ariſing alſo from the fifth pair, follows, to wit, whereby the Throat being opened, the chewed meats may be thruſt forward into its paſſage.

Another ſhoot is ſtretched out from this infolding into a like infolding of the wandring pair placed near, *Fig.* 9. α. The reaſon of this inſertion is delivered above, where we treat of the wandring Pair. But it may be obſerved further concerning this; when ſo nigh a communication happens between theſe infoldings, and when ſhoots are ſent from one of them into the Muſcles of the *Larynx*, and from another into the Muſcles of the Throat, from hence we may give a reaſon, why in Hyſterick diſtempers and in ſome Hypochondriacal there is ſo frequent and familiar a Symptom of the ſenſe of choaking in the Throat. For a Cramp or Convulſion being begun in any nerve, it is wont to creep forward further by the paſſage of the ſame, and ſo to invade ſometimes theſe parts, ſometimes thoſe ſucceſſively. If therefore at any time a Spaſm ariſes any where in any nerve of the wandring or intercoſtal pair, and from thence tending upwards or downwards, ſhall come to either infolding, preſently both being affected, and the Muſcles of the whole neighbourhood being contracted, a bulk or Tumor like a Globe or round thing in the Throat is excited with a ſenſe of choaking.

The intercoſtal Nerve deſcending a little lower, contains in the neck another greater infolding proper to man, to which a noted Vertebral nerve is inſerted alſo, out of which many nerves deſtinated to the *Præcordia*, are ſent forth on either ſide, *Fig.* 9. *T*. As to the principal parts, to wit, the Brain and Heart, there is no ſuch great difference between a Man and a Brute, as there is about the paſſage of one to the other, or the commerce that thoſe parts have mutually among themſelves. In either kind, for the exerciſe of the vital Function, the animal Spirits are derived

from the Head, with a conſtant emanation into the Heart; to which ſort of influence of theirs the paſſage of the wandring pair of nerves ſeems ſufficient: wherefore in moſt Brutes the paſſage to the Heart and its Appendix lyes open only by this way, and ſcarce at all by any nerves of the intercoſtal pair. But in Man the intercoſtal nerve, beſides its offices in the lower Belly, common to him with other Animals, ſerves in the place of a ſpecial Internuncius alſo before the Cloiſter of the Breaſt, which bears the mutual ſenſes of the Brain and Heart this way and that way, or to and fro. For when, beſides the nerves of the wandring pair, ſtretched out alſo into the humane *Præcordia*, (which certainly ſeem ſufficient for the executing of the offices of the Function merely vital) ſo many noted branches are ſent forth from the aforeſaid intercoſtal infolding, what kind of office ſhould be attributed to theſe, unleſs that they ſhould contain the animal Spirits, by whoſe work and miniſtry the mutual reſpects and affections of the Brain and Heart ſhould be communicated to one another? Whilſt I conſider this difference of either kind, it comes into my mind, that Brutes are like Machines framed with a more ſimple furniture and with leſs workmanſhip, and therefore furniſhed with a motion of one kind only, or determined for the doing ſtill the ſame thing. But in Man divers ſeries of motions, and as it were complications of wheels within wheels, appear. For indeed, by the paſſage of the aforeſaid infolding, the conceptions of the Brain preſently affect the Heart and its Veſſels, and cauſe the reſt of the Appendix, together with the Diaphragma, to be moved. Hence the motion of the blood and its inkindling in the Heart, together with the Pulſe and Reſpiration, are altered: and for that cauſe, from the Heart being altered, not only impreſſions are retorted upon the Brain by the paſſage of the ſame nerves, but alſo the blood it ſelf, its courſe being changed, drives to the Brain with a different or unaccuſtomed fluctuation, and ſo by moving the animal Spirits with various impulſes, cauſes firſt one ſort of conceptions, and then others to be produced: and ſo by reaſon of theſe reciprocal affections of the Heart and Brain, which are wont by a long ſeries to be propagated viciſſively, a multiplicity of thoughts and Phantaſms ariſes. Hence both the ancient Divines and Philoſophers placed wiſdom in the Heart. Certainly the Works of Prudence and Vertue depend very much on the mutual commerce which happens to the Heart with the Brain: becauſe, that cogitations about the acts of the Appetite or Judgment may be rightly deſcribed, it is behoveful for the flood of the blood to be reſtrained in the Breaſt, and the inordinations of it and of the Heart it ſelf to be governed by the Nerves, as it were by Reins, and to be compoſed into requiſite and apt motions. We might ſay more concerning this, but that this Speculation is from our purpoſe, and belongs more properly to Pathology or the Doctrine of the Paſſions of the Soul. In the mean time, we may refer hither one or two Obſervations taken from *Anatomy*.

When of late we had diſſected the Carcaſs of a man that was a Fool from his birth, we could find no defect or fault in the Brain, unleſs that its ſubſtance or bulk was very ſmall. But the chief note of difference which we obſerved between the parts of this man and of a man of judgment, was this, That the aforeſaid infolding of the intercoſtal Nerve, which we call the *Internuncius* of the Brain and Heart, proper to man, was very ſmall in this Fool, and beſet with a weaker guard of Nerves.

Whilſt we were writing theſe, we made an Anatomy of a Monkey, whoſe Brain differed little from that which is ſeen in a Dog or a Fox, unleſs that it was much more capacious in the proportion to the bulk of his Body, and the turnings and windings of it were larger. The orbicular Prominences called *Nates* and *Teſtes*, alſo the ringy Protuberance, ſent down from the Cerebel, came nearer the figure and magnitude of thoſe parts in a man. But what occurred chiefly worthy noting, was this, *viz.* That the intercoſtal Nerve, although even as it is wont to be in other Brutes, being included in the ſame ſheath with the Trunk of the eighth pair, was carried through the Neck, yet departing from this Nerve near the Chanel-bone, before it was inſerted into the infolding, placed nigh the roots of the upper Ribs, did ſend forth ſome ſhoots into the Heart and its Appendix, and certain Fibres into the nerve of the Diaphragma: which perhaps partly is the reaſon, why this Animal is ſo crafty and mimical above other Beaſts, and can ſo aptly ſhew and imitate, not only the geſtures, but the paſſions and ſome manners of a Man. But we will proceed to the explication of the intercoſtal Nerve from whence we have digreſſed.

We have already intimated for what uſe the Vertebral branch is inſerted into its cervical infolding. There is the ſame reaſon for this as for the other Vertebrals, which

which communicate with the intercoſtal Nerve almoſt in its whole paſſage. But for that the nerve of the *Diaphragma* is radicated in the ſame Vertebral nerve, from whence a branch comes into this infolding, I ſay from that a reaſon may be taken, why the motion of the *Diaphragma* intimately conſpires with the *Præcordia*, yea and with the conceptions of the Brain: which kind of Sympathy of the *Diaphragma* with the other parts, becauſe it is requiſite to be more ſtrict and noted in man, it is obſerved, That not only the Vertebral branch cometh between the infolding and the root of the nerve of the *Diaphragma*, but two and ſometimes three nerves are ſent from this infolding into the trunk it ſelf of the nerve of the *Diaphragma*, *Fig.* 9. ε. Truly from hence not only the joynt action or *Sympraxis* of the *Diaphragma* with the *Præcordia* may be derived; but alſo the genuine cauſe is here manifeſt, why Riſibility is a proper Affection of a man. For as often as the Imagination is affected by any pleaſant or wonderful conception, preſently the Heart deſires to rejoyce, and as it were by ſhaking off its load to be eaſed: wherefore that the blood might be more ſwiftly emptied out of its right boſom into the Lungs, and conſequently out of the left into the *Aorta*, the *Diaphragma*, inſtigated by the paſſage of the nerves going out of this infolding, is drawn upward by a more rapid *Syſtole*, and raiſes up the Lungs, as it were making iterated leaps, and cauſes them, by their more frequent ſtriking together, to drive out both the Air and the blood. Then foraſmuch as the ſame intercoſtal Nerve, which communicates lower with the nerve of the *Diaphragma*, is continued alſo higher with the maxillary Nerves, a cackling being made in the Breaſt, with it the geſture of the Mouth and Face pathetically anſwers.

One or two noted ſhoots and many nervous Fibres are carried from this infolding into the returning Nerve, *Fig.* 9. ζ. Certainly the reaſon of this communication ſeems to be, that the *Diaphragma* and the Heart it ſelf (into which nerves are ſent from this infolding) might yet more conſpire with the rough Artery (which the returning nerve affects) in its various actions, and eſpecially in laughing, weeping, and ſinging. Moreover, when the returning Nerves, by pulling upwards the Trunks of the *Aorta*, cauſe the blood, for the ſtirring up ſome Affections, to creep more ſwiftly towards the Head, they may in the performing that office be much helped by the aſſociate labour of the Nerves ſent from this infolding.

From this infolding in the Neck many ſmall fibres and ſhoots are ſpread into the ſanguiferous Veſſels, as alſo into the Coats of the *Trachea* and the *Oeſophagus*, *Fig.* 9. *ibid.* As to what belongs to the former that reſpect the *Trachea* and the blood-carrying Veſſels; their office is, that they may reſpectively draw together and ſpread abroad thoſe chanels of inſpired and exſpired blood and Air, according to the way and manner wherewith the Pulſe and Breathing ought to be performed; whereby the motions of either might be the better retarded or accelerated, according to the neceſſities or requirings of the Heart. Then numerous Fibres are ſtretched out from this infolding into the Coats of the *Oeſophagus* placed near, that by this means the admirable conſent between the Heart and the Stomach, by reaſon of the Nerves being reached forth from this infolding and from the wandring pair to both, may be produced.

Concerning the Cardiack branches ſent from this infolding, we need not diſcourſe any more: after having but now intimated, that theſe were as it were *Internuncii* peculiar to men, which carrying to and fro the reciprocal impreſſions of the Brain and Heart, cauſe Commerces in both Kingdoms. But foraſmuch as Nerves of a double kind, *viz.* of the wandring and intercoſtal pair, reſpect the humane *Præcordia*, leſt the geſtures of one ſhould be different from thoſe of the other, therefore the *Cardiack* branches, which are of either family, partly communicate in the ſame infolding, and are partly inoculated mutually by ſhoots ſent forth before they are diſtributed into the Heart it ſelf.

Below the Cervical infolding, the intercoſtal Trunk being demerſed within the *Thorax*, admits three Vertebral Nerves ariſing higher, and conſtitutes the other infolding, which is commonly called the Intercoſtal, but more properly the *Thoracical* infolding, *Fig.* 9. Θ. In this place the intercoſtal Nerve being about to paſs into its laſt and more large Province, *viz.* the *Viſcera* of the lower Belly, and therefore ſeeking aid for the journey, and as it were a *Viaticum* for it ſelf, it gets together in this infolding an increaſe or aiding forces from the Vertebral nerves, and afterwards receives lower others freſh nigh the ſeveral knots of the *Vertebræ*; becauſe it will have need of a great ſtock of Spirits, which it muſt beſtow on the Meſenterick infoldings, and on other parts of the *Abdomen*. That

That this Nerve about to enter the Thoracical infolding, doth bind the Chanel-bone Artery, *Fig.* 9. *l.* and that the ſuperior branch of the Vertebral, being ſent into the ſame infolding, doth bind about the Vertebral Artery, *Fig.* 9. *s.* the reaſon of both ſeems, that the blood, for the uſes and neceſſities of the lower *Viſcera* (to which the intercoſtal Nerve from thence ſerves) may be driven forward with a more plentiful afflux downwards: which thing thoſe Nerves eaſily do by pulling together the blood-carrying Veſſels towards their infolding; ſo that they attempt this ſnatching of the blood in oppoſition to that which the returning Nerves perform. And indeed when the blood, tending upwards and downwards, is wont ſometimes to flow too much towards either bound, ſometimes to be wanting; therefore the nerves, as it were an incitement or remora, are variouſly diſpoſed both in the upper and lower region of the Circuit about the ſanguiferous Veſſels. After what manner this Thoracical infolding is in brute Beaſts, ſhall be particularly ſhewn hereafter. The intercoſtal Nerve in a Man, both in this infolding and in the whole deſcent through the *Thorax*, receives many Vertebral nerves, as if ſparing of its own ſtock, and greedy of anothers, but ſends forth from it ſelf not a ſhoot: whatever of Spirits is remaining either from the influence above, or comes to it by the by, is reſerved wholly for a largeſs to be beſtowed on the *Viſcera* of the lower Belly. But after what manner, and by what paſſages of nerves that is diſpenſed into the ſeveral parts, we will unfold in the following Chapter.

CHAP. XXVII.

The lower Branching of the Intercoſtal Nerve belonging to the Parts and Viſcera *of the lower Belly is unfolded.*

After the intercoſtal Pair hath paſt through the hollowneſs of the *Thorax* without any expence of Spirits, unleſs in the Neck-infolding, at length it ſends down from the region of the Ventricle on both ſides, a noted Branch; either of which preſently becoming divided into two, conſtitute two peculiar Infoldings on either ſide; but one infolding ariſes in the midſt of them, as if common to either ſide. Of the infoldings which are on the left ſide, one reſpects the Kidney, and the other the Ventricle with the Spleen; but of thoſe which are on the oppoſite ſide, one reſpects the right Kidney, and the other the Liver and its neighbouring part. In the midſt of theſe, the infolding proper to the *Meſentery* and the biggeſt, is placed as the Sun among the other *Planets*. Further, from theſe are ſent forth one to another and into the neighbouring parts numerous Fibres very thickly, as it were dartings of rays. *Fig.* 11. plainly ſhews all theſe.

Concerning theſe, in the firſt place, it ſhall be inquired into in general, For what end ſo many nervous infoldings, with almoſt innumerable fibres and ſhoots, are diſtributed about the Meſentery and the *Viſcera* of the *Abdomen*. For when in theſe parts the fibres and nervous ſhoots are carried on every ſide with ſo thick a ſeries, that they are variouſly infolded with their manifold meeting, it may ſeem wonderful, if every one of theſe be deſtinated to ſome uſes, and are not rather ſprinkled here and there by chance, and as it were by the inconſiderate ſporting of Nature. And indeed any one can ſcarce think, that ſo many Veſſels ſhould be prepared for the performing the offices of motion or ſenſe in that place. For thoſe *Viſcera*, unleſs highly pulled and affected with a Convulſion, are ſenſible of little or nothing that we know of; and their motions are almoſt no other thing than obſcure Vermiculations or light Corrugations, ſo that for the effecting them there is required no greater preparation than for the ſlow progreſs of a Snail. Wherefore from hence it hath come into the mind of ſome, that a certain Juyce, and that perhaps nutritious, was diſpenſed by this manifold paſſage of the nervous Pipes: which ſort of office however if aſſigned to theſe Fibres diſperſed about the Meſentery, why ſhould not the ſame office either of receiving or of carrying of nouriſhment, be granted to thoſe in like manner divaricated about the Lungs and the *Præcordia*, and eſpecially about the rough *Artery?* But truly it

it is highly improbable, that a nutritious Juyce ſhould be contained in the Coats of the *Trachea* or of the *Bronchia*, which the nerves may ſuck out; nor does it more clearly appear, why more nerves ſhould be deſtinated for the carrying of the alible Juyce to theſe parts of the Abdomen, or thoſe of the Breaſt, than is needful for the muſculous ſtock. But in the mean time, though we deny, that the whole nutritious matter is carried this way and that way by thoſe or the other nerves; yet we think, that within thoſe nervous paſſages an humor doth perpetually abound, which may be for a Vehicle of the animal Spirits, and a Ferment for the nutritious matter: with which going with the nervous humor towards the Inteſtines and to the other ſinks of the Body, it is likely, that the ſuperfluous and excrementitious ſeroſities do often ſlide down together, and ſo are carried out.

But it may be well thought, as to the Meſenterick Nerves, and Infoldings in which they are terminated, and the Fibres moſt thickly going out of theſe, that theſe different manner of Veſſels are firſt Chanels, then Storehouſes, and laſtly the laſt Emiſſaries of the animal Spirits. If it ſhould be demanded, for what end ſo great plenty of Spirits ſhould be deſigned for theſe ignobler parts; I ſay, that this is done for the performing the acts of Motion and Senſe there, which are highly neceſſary for the preſerving of life it ſelf. For although local motion, which is always performed by the help of a Muſcle, as of a Spring, is not convenient for the *Viſcera* of the lower Belly; yet inteſtine motions are brought forth by them almoſt continually, and after many faſhions: *viz.* for the ſubduing the Chyle, alſo for the ſeparation of ſome parts and particles from others, both of that, and alſo of the bloody Liquor, and the protruſion of every one towards their deſigned bounds, the Fibres and nervous ſhoots reaching into the Membranes of the *Viſcera* and the Coats of the Veſſels, yea and into the textures of the *Parenchyma*, are variouſly drawn together, to wit, theſe are pulled upwards, thoſe downwards; ſometimes many together, ſometimes apart or ſucceſſively, are wont to be drawn hither and thither. In truth, it is a ſign of the indiſcontinued action of theſe *Viſcera*, that as well in ſleep, and perhaps more than in waking, the Culinary work of Nutrition is performed; and whilſt the Organs of the other Faculties are at reſt, there is no quiet granted to theſe: but that the Meſenterick nerves perpetually grinding in the Mill, are always buſied for the preparing the alible humor and the exporting the ſame towards all parts.

Moreover in theſe parts, to which the aforeſaid Nerves belong, there is found an exquiſite feeling no leſs than a motive Faculty; for whatſoever heterogeneous or hurtful thing, mixed with the Chyle or blood, is brought to any *Viſcera*, preſently the Spirits, inhabiting thoſe parts, being warned of the evil, do greatly tumultuate as it were by entring into a Conſpiracy, that what is hoſtile or troubleſom they might ſhut out. But indeed, becauſe the animal Spirits, flowing by the paſſage of the intercoſtal nerve to the Inteſtines and *Viſcera* akin to them, proceed from the Cerebel; therefore the buſineſſes of either Faculty, to wit, both the ſenſitive and locomotive, foraſmuch as they are performed the Brain unconſulted, and the animal ſcarce knowing it, are not ſo openly taken notice of, and for that reaſon they are accounted of leſs than the ſpontaneous acts of the other parts.

But as to the manner it ſelf or way of the œconomy, whereby the animal Spirits, deſtinated to the *Viſcera* of the lower Belly, are exerciſed, we affirm, That plenty of them flow into all the Meſentetick infoldings by the paſſage of the nerves ſent from the intercoſtal pair; where being heaped up to a fulneſs, as it were in ſo many Storehouſes or places of Receipt, they are kept to be diſtributed from thence into ſeveral parts, as occaſion requires. But that the Spirits flow out of theſe infoldings, not through ſingular and larger branches, (as is done in the Muſcles) but as it were by Troops of Fibres, into their proper tasks, the reaſon is, becauſe here the buſineſs is performed otherwiſe than in the muſculous ſtock. For where a Muſcle is fixed to the part to be moved, its implanted Fibres perform the whole work of Contraction, or of the motive endeavour; but it ſuffices for the nerve ſtill to convey new ſupplements of Spirits, and as occaſion ſerves, the Inſtincts of the Motion to be performed: but in the Membranes and the *Viſcera*, where Muſcles are wanting, the nervous Fibres themſelves moſt thickly implanted, and diſtributed as it were ſo many little ropes, almoſt into every part of the ſubject, perform the buſineſs of Traction or drawing by themſelves and their own proper endeavour or force partly; and partly ſolicite or ſtir up into motion the Fibres implanted in the *Viſcera* diſpoſed after an uncertain order; which they determinate in their action, and moderate or govern them,

them, as it were ſo many fingers laid upon the ſtrings of a muſical Inſtrument. For although the Membranes and the *Viſcera* themſelves are indued with ſome implanted Fibres; yet theſe are not, as it is in the Muſcles, of one kind and poſition; but in the ſame part ſome are ſtraight, and others oblique or crooked, theſe tend upwards, thoſe downwards, and others are carried round; ſo that divers ſorts of motions ought to be performed in the ſame Membrane or Inward, ſometimes together, ſometimes ſucceſſively or by turns: wherefore diſtinct nerves are required, not only for the ſeveral ſeries of Fibres, but for all the parts of the ſubject, to wit, which may ſtop here a motion begun in that place, and may begin another anew, or may unite one with another. Truly the motion which is performed in the muſculous ſtock ſeems like the rude and more ſimple work of ſome Weaver, where the ſhuttle being always caſt after the ſame manner, the Woof is laid under the Thread or Yarn: but the motions of the Inteſtines and *Viſcera* may be aptly compared to a Texture very much variegated or flouriſhed, for the weaving of whoſe more artificial ſubſtance or making there is made uſe of many hands together, or of a Machine diverſly turning about, and furniſhed with more than a thouſand ſorts of motions.

Concerning the many Meſenterick Nerves, and Shoots, and nervous Fibres which go out of them by bands, we muſt conſider chiefly theſe two things: to wit, what may be the office of each of them for the ſtirring up of motion or ſenſe, either of them, or both together in any part: then ſecondly, what the communication of either of them may be with other nerves, infoldings or bundles of nerves, by reaſon of which a Sympathy or conſent of actions ariſes at once in divers parts. According to theſe two reſpects we will particularly weigh now the ſeveral nervous Veſſels belonging to the *Viſcera* of the lower Belly.

Therefore in the left ſide the ſupreme Meſenterick branch being preſently forked like the figure of the Letter Y, contains in its upper ſhoot the Stomachical infolding, which is alſo the Splenetick, and in the other lower the Renal infolding or that belonging to the Reins. Moreover, about the knot of diviſion it ſends forth ſome ſhoots to the greateſt infolding of the Meſentery, *Fig.* 11. *F. G.* Hence a reaſon is plain, wherefore there happens ſuch affinity between the Ventricle and the Spleen, and between the Meſentery and the Reins, ſo that the very often and familiar Symptom of Vomiting is both in Splenetick, Colical, and Nephritick people: becauſe when a Convulſion is begun in any part or Inward, which the Meſenterick nerve reſpects, preſently other parts, to which the infoldings or ſhoots of the ſame nerve belong, are drawn into conſent.

From this lower infolding a little bundle of Nerves being carried towards the Stomach, inſerts its Fibres partly in its bottom, and partly ſends them to meet with other Fibres ſent down from the nerve of the Stomach, *Fig.* 11. *n.* The reaſon of the former is, That whereas there are many Coats of the Ventricle, and divers ſeries of Fibres are diſpoſed in them, for the actuating all of which with a due influx of animal Spirits, the Stomachical nerves, derived from the wandring pair, are not ſufficient; it was fit, that for the outward Court as it were or Precinct of this Inward, to wit, for the outmoſt bottom of it, ſome forces of Spirits might be ſupplied from ſome ſtrange Kingdom, to wit, from the aforeſaid nervous infolding of the Abdomen. Inſtead of this, Spirits alſo may ſlide downwards from the ſame Stomachical branch through other Fibres ſent down, and be ſent into this Splenetick infolding. Beſides alſo it is obſerved, That the adventitious nerves aptly conſpire with the former, being of the proper dominion of the Ventricle, and that either are not only inoculated within the confines of the Inward it ſelf, but they run into mutual embraces without it, and as it were joyn hands together.

It ſeems plain, that the nervous Filaments being carried from the aforeſaid infolding to the bottom of the Ventricle, may ſerve there for the performing the acts of Motion and Senſation: but it doth not ſo eaſily appear with what office the other handful of Fibres reaching out from hence into the Spleen is charged (*Fig.* 11. *ζ.*) becauſe this Inward is ſaid to be deſtitute wholly of every animal Faculty. When we did elſewhere inquire into the uſe of the Spleen, we thought good to affirm, That its office was to ſeparate the dregs of the Blood and the acid-ſaline Particles, and whatſoever were of a more fixed nature, and to concoct them more being received into its own boſom, and to convert them into an acid Ferment; by which being again delivered to the blood through the Veins, a ſharpneſs and an aſperity, as alſo an active or fermentative virtue are gotten forits *Latex*. Wherefore the whole ſub-

ſtance

ſtance of the Spleen conſiſts of a texture of Fibres in the form of a net; to wit, that the Feculencies of the blood might be more plentifully received, and contained within its ſpongy cavities and thick paſſages. I ſay therefore, that for the fit preſerving and diſpenſing of the Splenetick Ferment, beſides the Arteries which carry matter, and the Veins which continually ſup back ſome portion of the ſame fermented, there ſeems to be need of many nerves alſo, which both by pulling the fibrous texture of the Spleen, might cauſe the melancholick and dark *Fæces*, laid up in it, to be ſhaken together, and ſo by defending it from putrefaction and coagulation, cauſe it to be imbued with an acid and fermentative nature; and alſo that thoſe nerves may ſometimes draw together and conſtrain the blood-carrying Veſſels, ſometimes open and inlarge them; that as occaſion ſerves, the Feculencies of the blood may be ſometimes more plentifully, ſometimes more ſparingly laid aſide out of the Arteries into the Spleen; alſo that more or leſs of the Ferment, preſerved in the Spleen, may be poured out on the blood according to the requirings of the Paſſions or of the natural Inſtinct. No Hypochondriack but doth abundantly perceive, that ſome Splenetick nerves do perform motions; for thoſe great perturbations which are wont to be excited in the left ſide, as when ſometimes Inflations, ſometimes conſtrictions of the inward parts, and ſometimes various concuſſions are perceived with a wandring pain running here and there, they are only Spaſms or Convulſions or wrinklings together, with which the nerves of the Spleen are ordinarily affected. Nor do its nerves, taken with a Convulſion, ſtir up tumults only in the neighbourhood of the Spleen, but oftentimes further into the Heart it ſelf, yea into the whole Body the effects of their inordinations are carried. I have known an Hypochondriack, who preſently upon the Spleen being diſturbed, ſeemed to have his *Præcordia*, being drawn downwards, to be cruelly preſt and bound together; ſo that being very ſad and dejected in his mind, alſo complaining of an exceeding great ſtraitneſs and conſtriction of his Breaſt, he thought himſelf almoſt dead. The cauſe of which kind of diſtemper was without doubt, that when many Fibres going out of the Splenetick infolding are united with other Fibres ſent from the fartheſt end of the wandring pair, it eaſily happens, that the former, being diſtempered with the Convulſion, do draw together and pull downwards their yoke-fellows, and by conſequence the Trunk it ſelf of the wandring pair, from which the nerves are ſent into the *Præcordia:* certainly by the *Sympraxis* or joynt action of either kind of the aforeſaid nerves, *viz.* whereof theſe reſpect the Spleen, thoſe the *Præcordia*, it is effected, that the Trembling, Oppreſſion, and other grievous Diſtempers of the Heart, as alſo of the Spleen, ſo ordinarily happen. Further, foraſmuch as the Fermentation of the blood depends on the Spleen, according to the influence of this, that performs its Circulation, ſometimes pleaſantly, ſometimes diſturbedly. Whilſt the Spleen is at quiet, and free from any perturbation, the blood alſo is quietly moved in Hypochondriacal perſons; but if the ſame be moved and exerciſed, (as it is wont to be in any paſſion or violent motion of the Body, or by a Medicine) preſently its nerves being diſtempered with a Convulſion, ſhake it more with reiterated contractions; ſo that the fermentative Feculencies, being ſhaken out of its boſom, flow back more plentifully into the blood, which cauſe its *Latex* preſently to be troubled, and as it were muddy, and ſharpen it with ſo great acrimony and mordacity, that it burns and pricks the Brain and Heart like needles; from whence in Splenetick people, beſides that the Reaſon is obſcured, the affections of the Mind, eſpecially Sadneſs, Hatred, and Anger are very much increaſed.

Concerning the Splenetick Nerves, by another conjecture, we are yet brought to believe, that they, beſides the exerciſe of the motive Faculty, do both inſtil into the Spleen its own humor, which promotes the fermentative virtue of that Inward; and alſo (becauſe the nerves, as was ſhewn already, convey the Spirits, and ſometimes the humors by either way, *viz.* forward and backward) the ſame implanted in the Spleen, do often imbibe from it an acetous or Vinegar-like humor, and as it were Vitriolick, from whoſe acrimony and notable twitching, they are forced into Convulſions.

But foraſmuch as the nervous Infolding reſpecting the Spleen, communicates more nearly with the Ventricle, Meſentery, Liver, and Kidneys, and more remotely with the *Præcordia* and other parts placed at a diſtance; from hence the cauſe is plain, wherefore not only theſe ſeveral *Viſcera* and parts, by reaſon of the fault of the Spleen, are folded together; but alſo on the contrary, why the Spleen being indiſpoſed by any Diſeaſe, or trouble raiſed up in any of thoſe parts, is wont to be diſturbed: ſo it is

not altogether for nothing, that the Symptoms every where infeſting, the cauſe of them being unknown, are aſcribed ordinarily to the Spleen; becauſe it fixes not only its own inordinations in other parts, but alſo ſuffers for their peculiar faults: which notwithſtanding is wrongfully aſcribed to Vapours tranſmitted from this or that part, when the formal reaſon of every Diſtemper of this kind for the moſt part conſiſts in the communication made through the Nerves.

The lower Infolding of the left ſide ſeems to be made for the Kidney placed near, into which chiefly the bundle of its Fibres is carried, *Fig.* 11. ϒ. γ. γ. Certainly that theſe nerves, following the emulgent Veſſels, do embrace the ſame, and bind them about with a various and frequent complication; that is ſo made for that end, that by reaſon of the Artery being ſo ſtrained and frequently ſhaken by the drawings of the nerves, the Serum may the more eaſily be precipitated from the blood: wherefore it is obſerved in very great difficulty or danger, when the mind and all the nerves are ſtrained for fear, that a frequent and more plentiful making of water, and that often painful, is wont to be provoked.

The Renal Infolding receives, beſides the Nerve common to it with the upper infolding, another new and peculiar one from the intercoſtal nerve, or rather that coming between from the ſpinal Marrow, *Fig.* 11. β. Hence it is, that the Loyns have a great conſent with the Reins, and ſuffer ſo ordinarily for their Diſtempers with a grievous and largely diffuſive pain. Foraſmuch as this infolding communicates with the greateſt of the Meſentery, the Colick diſtemper and the Nephritick are much akin, and it is often difficult to diſtinguiſh their fits one from the other.

The Meſenterick branch in the right ſide, as well as the left, being forked, contains two infoldings: the upper of theſe (which we call the Hepatick) ſends forth from it ſelf many little bundles of nervous Fibres; the greateſt of which being carried towards the Liver, cloaths the Hepatick Artery as it were with a Net made of Fibres, *Fig.* 11. δ. ο. The moſt Learned *Gliſſon* obſerves, That the Hepatick Artery is beſtowed on the Trunks of the Veſſels, to wit, of the common Cheſt, of the bilary Pore, and of the *Vena Porta*; for the watering of which, and for the actuating them with heat and nouriſhing Juyce, it carries the arterious Blood; to which notwithſtanding for the recarrying, an aſſociate Vein is wholly wanting: wherefore that ought to carry the blood, not with a full and free influx, but by little and little, and always in a conſtant meaſure to thoſe membranaceous parts: for otherwiſe there had been danger, leſt from the bloody *Latex* plentifully ruſhing forward, for that it could not be ſtill remanded preſently through the Veins, an Inflammation ſhould be excited, or leſt from its torrent being transfuſed beyond its banks, the courſes of the other rivers in the Liver ſhould be diſturbed. But for that the nerves, like Reins, do bind about the Trunk of the Artery, the inflowing of the blood it ſelf is moderated, and they cauſe it variouſly to be diſpenſed according to the wants of thoſe parts to which it is deſtinated.

From the Troop of Nerves going out towards the Liver, ſome bend down into the *Pancreas*, and others into the *Cholidock* Veſſels, *Duodenum*, and *Pylorus*, and ſow into them thick ſeries of ſhoots, *Fig.* 11. π. π. The office of theſe ſeems to be, to pull together the excretory paſſages of thoſe parts, and to ſhake them for the cauſing Evacuations of the boiling or turging humors upon occaſion. Further, from theſe Fibres being carried upwards, when many others ſent from either Stomachical nerve are united, the reaſon is plain, why from an hawling or pulling made about the Ventricle, the yellow Bile is drawn out of the Gall-cheſt into the *Duodenum*, which being carried from thence into the Ventricle, by reaſon of a Convulſion of that ſame Inteſtine, is caſt up by Vomit: becauſe the Stomachical nerves being irritated by a Medicine, or by any troubleſom thing, for the making an Evacuation above, and for that cauſe drawn from thence upwards, they draw together the nerves belonging to the Liver and the *Cholidock* Veſſels, for that they are tied to them, and bring them into conſent with the ſuperior Spaſm or Convulſion. Hence it happens, that not only the Stomach being firſt tired, draws to it ſelf the Bile by its Convulſion, and allures it into its own boſom; but the Bile alſo of its own accord growing turgid, and ſo being poured out into the *Duodenum*, foraſmuch as it irritates the nerves of this Inteſtine, and then by their conſent, provokes the nervous Veſſels of the Ventricle, it preſently induces a cholerick Vomiting.

The Hepatick Infolding communicates with the Splenetick by Fibres going between either, *Fig.* 11. θ. The reaſon of which ſeems to be, That when one infolding reſpects

ſpects the end or the right extremity of the Ventricle, and another the left; that a conſent in either and a joynt action may be made towards the Stomach, both communicate between themſelves by nerves, as if *Internuntii*. Truly it ſeems to come to paſs by the paſſage of theſe nerves, that the *Hypochondriacal* pains oftentimes run from the left ſide into the right; to wit, for that a Spaſm or Convulſion begun in the Splenetick infolding, is wont to be carried to the Hepatick.

Between the *Hepatick* Infolding and the greateſt of the *Meſentery*, many Fibres reaching out by bands, are caſt out in the midſt, *Fig.* 11. *p. p.* the office of which is to ſuſtain a certain commerce and Sympathy; to wit, ſuch an one is required, both that the Chyle may be miniſtred from the Inteſtines towards the Liver ſtill in due proportion, alſo that the Bile may opportunely ſlide out from the Gall-bladder into the Inteſtines for the provoking of Excretion. For we are of this Opinion, That the Meſeraick Veins ſucking out a certain portion of the Chyle from the Inteſtines, immediately transfer it through the region of the Liver into the *Vena Cava*, whereby the blood in the aſcending Trunk of the hollow Vein or *Vena Cava*, might be freſhly imbued with nouriſhing Juyce; even as in its deſcending Trunk it is refreſhed, the ſame being poured out through the *Thoracical* Veſſels or thoſe belonging to the *Thorax*. Wherefore it is needful, that there ſhould be a very ſtrict affinity between theſe *Viſcera*; and the rather, becauſe the Bile ought to be poured out from the Gall-cheſt to the Inteſtines, not continually, but for ſome uſes, by occaſions and intervals. For the Nerves knowing beſt the wants of either part, warn them both of their mutual duty, and as occaſion ſerves, ſtir them into action.

It is obſerved, That in the right ſide an ample Nerve is ſtretched out between the *Hepatick* and *Renal* infolding, *Fig.* 11. *μ*. So that between theſe infoldings a greater and more immediate conſent is had, than between thoſe pairs of the other ſide. The reaſon of which doth not eaſily appear, unleſs perhaps it ſhould be ſo made for this end, that when from the Reins, in making of water, there is an endeavour of the ſerous Excretion, the *Pylorus* and the *Cholidock* Veſſels being at once drawn downwards, a protruſion of the Chyle and *Fæces* might be provoked towards the lower parts of the Belly. Certainly this connexion of theſe infoldings is chiefly the cauſe, why oftentimes moſt cruel Vomiting uſes to come upon a Fit of the Stone; and that from ſuch a Vomiting the *Cholidock* Veſſels are very much emptied, as if provoked by taking an Emetick.

The greateſt Infolding of the Meſentery being placed in the midſt of the reſt, like the Sun, diſperſes every where round about nervous Fibres like rays, *Fig.* 11. ⊙. and caſts them not only on every one of thoſe infoldings, as if ſo many Planets with a peculiar Aſpect, or *Actinoboliſm* or Irradiation, but alſo it diſtributes them into many Inteſtines, ſanguiferous Veſſels, and other parts lying round about: without doubt upon theſe nervous Filaments, which are carried from this infolding to the Inteſtines, as Lines from the Centre to the Circumference, every action of the Inteſtines, and eſpecially the Periſtaltick motion of the Vermiculation, depends; namely for that theſe Fibres do move ſucceſſively, and ſtill move further every begun action, as it were with a ſpiral or Screw-like progreſs.

That from this Infolding many Fibres and ſhoots going forth, are inſerted into the Trunk of the *Aorta* nigh its deſcending, and that theſe reaching towards the Inteſtines, accompany the Blood-carrying Veſſels, and in ſeveral places climb over them; from hence it may be inferred, That nerves alſo in the Abdomen are like Bridles and Reins caſt on the ſanguiferous Veſſels, which either by ſtraining or pulling them together, may ſometimes retard, ſometimes incite the courſe of the blood according to the needs of the lower *Viſcera*.

From the greateſt Infolding of the *Meſentery* ſome noted Fibres and ſhoots are ſent out into the *Glandula's* of the Womb or the Womens Teſticles, *Fig.* 11. *τ. τ.* Into which alſo other ſhoots from the Trunk of the intercoſtal Nerve, *ibid. υ. υ.* and others going out of the nerve which comes between this infolding and the loweſt of the Abdomen, do come together, *ibid.* ⸸. ⸸. So that a proviſion of Spirits is carried into thoſe parts from a threefold Store-houſe; which indeed is much larger than is done in the other Sex, when we find ſcarce any nerve to belong to mens Teſticles. Indeed the Womb, beſides that it is a very ſenſible part, ought alſo to be moved diverſly, and in bringing forth a child very ſtrongly: wherefore there are granted to this both more ſtrong implanted Fibres, and alſo Nerves of a various kind and original.

Moſt of the Infoldings of the Abdomen, but eſpecially the loweſt, and that re-

lated to it the greateſt of the Meſentery, are oftentimes affected in the Paſſions commonly called Hyſterical, as ſhall be preſently declared. Therefore if at any time ſuch diſtempers proceed from the Womb, the cauſe is manifeſt wherefore the aforeſaid infoldings are drawn into conſent. But we have elſewhere ſhewn, That thoſe Paſſions are merely convulſive, and not ſeldom excited without any fault in the Womb. Further, that Symptom very frequent in thoſe kind of Fits, to wit, in which as it were a Globe is perceived to be carried from the bottom of the Belly, and about the Navel to leap out impetuouſly, which therefore is thought to be an aſcent of the Womb; I ſay, that it is nothing elſe than moſt cruel Convulſions of theſe infoldings. Indeed oftentimes in Women, and ſometimes alſo in Men, I have known when the convulſive Affection hath invaded, that a bulk in the *Hypogaſtrium* hath been ſeen to ariſe, then about the midſt of the *Abdomen* ſo great a ſwelling to follow, that it could not be hindred or preſt down, though ſtrongly attempted by the hands of a ſtrong man. Without doubt, the cauſe of this admirable diſtemper is, that within the nerves of the intercoſtal pair the inflowing animal Spirits, as often as they begin diſorders or convulſive motions, firſt (as it is wont to be) begin to grow hot or to be exploded about the extremities of the nerve, to wit, in the loweſt infolding of the *Abdomen*; which affection of theirs, when creeping upwards it is carried to the greateſt infolding of the Meſentery, ſo that the Spirits inhabiting it are taken with the like inordination, it is no wonder, if that ſwelling up of the middle of the *Abdomen*, and as it were an exploſion of a certain nitroſulphureous matter, ſhould be ſtirred up. For truly it is not probable, that that Symptom ſhould be excited from the Womb aſcending and being removed from its place, becauſe, beſides this part being fixed in its place and firmly eſtabliſhed with Ligaments, the bulk of it alſo in Virgins is ſo ſmall, ſcarce exceeding the bigneſs of a Walnut, that although it ſhould be carried up into the Belly, it could not produce ſuch a ſwelling. Nor is it more likely, that this ſort of diſtemper is ſtirred up from the Muſcles of the *Abdomen* taken with a Convulſion: for they, however convulſive, draw together themſelves and ſubjected parts upwards or downwards, or of one ſide, but they are not able by any means to bear themſelves aloft, and to lift up on high, with a force, the region of the Navel. But, as we ſuppoſe, the animal Spirits in the greateſt infolding of the Meſentery growing fierce, and becoming apt to be exploded, (as ſuch indeed they are whenever they enter into convulſive motions) they being there gathered round thickly into a Globe, do mainly blow up and lift on high with their effervеſcency and notable rarefaction that infolding with its whole neighbourhood, and at once drive upward the *Viſcera* lying upon it with a certain vibration or ſhaking. A more full explication of this Symptom belongs to the Pathology of the Brain and Nerves.

In the mean time we ſhall take notice, that another certain Diſtemper, *viz.* the *Colical* grief doth belong to the infoldings of the *Abdomen*, and eſpecially to this greateſt of the Meſentery. For it may be thought, that the moſt cruel torments that are wont to be excited in this diſeaſe do come, not from an excrementitious matter ſhut up in the cavities of the Inteſtines, nor always from a ſharp humor impacted in their Coats, but oftner from the nervous Juyce imbued with a certain acrimony, and ſtagnating within this infolding; from whence, by reaſon of a conſent of this with the infoldings both Hepatick and Splenetick, a frequent and cruel Vomiting comes upon theſe pains. But theſe *Pathologick* Speculations being referred to their places, we will follow what we firſt of all inſtituted, the further paſſage of the intercoſtal Nerve, by which we are led to the two leſſer and loweſt Infoldings of the *Abdomen*.

Below the Meſenterick Nerves, out of which the ſuperior Infoldings are made, either deſcending intercoſtal Trunk ſends forth three or four ſingular ſhoots, which are carried into the Ureters, *Fig.* 11. *v. v.* The uſe of theſe ſeems to be, to pull together, and to jog or ſhake thoſe urinary Chanels, that the Serum ſeparated in the Reins, may be the more readily drawn out towards the Bladder. Moreover, if at any time a viſcous or muddy matter doth ſtick to the paſſages of the Ureters, or a more fixed ſtone doth obſtruct their Cavities, they, by the help of the Nerves inſerted here and there in their whole tract, being pulled together and wrinkled, may preſs down and always move forward any bulk or ſubſtance ſtaying in the paſſage.

Nigh the *Vertebræ*, out of which the Crural Nerves begin to go forward, three diſtinct branches brought to either intercoſtal Nerve, are carried from thence into the loweſt hollowneſs of the Belly, where they make the infolding which is the loweſt of the *Abdomen*, *Fig.* 11. ♁. φ. φ. φ. That here ſo many nerves, to wit, ſix large ones joyning

joyning together do make but a ſmall infolding, *viz.* a leſſer than is raiſed higher in a ſingle branch of the nerve; the reaſon is, becauſe this infolding is like an Inn, where the inflowing Spirits dwell no long time, but it receiving them only in their paſſage, preſently commits them to other infoldings placed here and there above, below, and of one ſide, and made for divers offices; for from hence the chief paſſage, and as it were a broad way, leads to the greateſt infolding of the Meſentery; moreover, from hence nerves, diverſly going out, make three other infoldings, which reſpect the parts and ways by which the ſeveral Excretions, to wit, of the Dung, Urine, and Seed, are made in the lower Belly.

The firſt Nerve therefore ſent out of this loweſt Infolding into the greateſt of the Meſentery, a little before it reaches to it, imparts two noted ſhoots to the Glandula's of the Womb; but in its aſcent it admits four other branches, as it were ſubſidiary, *viz.* two on either ſide from the intercoſtal pair, *Fig.* 11. χ. ſo that the nerve here ſeems to be the chief means of paſſage of the animal Spirits deſtinated to the greateſt infolding of the Meſentery and to the uterine Glandula's; which paſſage however is carried into the deſigned parts, not immediately, but a compaſs being made, it firſt goes forward beyond its bound, and at length with a certain going back. The reaſon of which is, that the motions of all the Inteſtines, *viz.* the Vermiculations ſhould be directed downwards towards the ſtraight Inteſtine, and alſo that the actions of the Womb ſhould tend thither; therefore 'twas fit, that the animal Spirits ſhould be ſupplied from below whither the motion inclined. For by the like means, this Meſenterick nerve and the two returning nerves, being firſt carried lower, aſcend into their Provinces; to wit, that they may pull together the reſpective parts toward that bound placed below, as it were to a Pully.

Further, for this end, to wit, that the influence of the Spirits actuating ſome Inteſtines, might be derived lower; the other infolding of the Abdomen, to wit, the leaſt, is added immediately to this. Becauſe upon the Nerves being carried from hence about an inch, there grows a ſmall infolding; out of which, one nerve being ſent out into the greateſt infolding of the *Meſentery*, ſtretches it ſelf under the top of the ſtraight Inteſtine and part of the *Colon*, *Fig.* 11. ♀. *a.* And another nerve, deſcending from this infolding, is carried under the loweſt part of the ſame ſtraight Inteſtine, *Fig.* 11. *b.* which alſo, two ſhoots carried from the infoldings placed in the *Pelvis* or Baſon, meet, *Fig.* 11. *d. d.* It will not be hard to declare the uſes of this infolding and its nerves: becauſe all thoſe nervous paſſages are emptied about the offices and motions of the ſtraight Inteſtine. The aſcending nerve directs the Vermiculations of the ſame ſtraight Inteſtine, as alſo of the lower part of the Colon, and then (the greateſt infolding of the Meſentery mediating) of ſome other Inteſtines to be made downwards; but the deſcending nerve, in oppoſition to the other, drawing the loweſt part of the ſtraight Inteſtine upwards, takes care that the Excrements being carried towards the Arſe-hole, may not ſlide out ſuddenly and unexpectedly. Then foraſmuch as two nerves from the two infoldings placed within the Baſon or Tunnel, (which infoldings immediately admitting a noted Vertebral branch, are partakers of the ſpontaneous Function) meet with this deſcending nerve, and are ingraffed into it; it comes to paſs from all of them together, that the Excrements being detained at the doors, when it ſhall be convenient, the Appetite commanding, are caſt out. Nature, that it might ſhun filthineſs, is ſo careful, that for the carrying out of the Excrements it conſtitutes nervous Veſſels, with as noted a proviſion, as for the performing any where of the moſt ſplendid offices.

From the loweſt Infolding of the *Abdomen*, two nerves being ſent into the Tunnel, receive there on both ſides a noted Vertebral Nerve; and ſo conſtitute two infoldings, to wit, one in either ſide, *Fig.* 11. *C.C. K.K.* Theſe infoldings near the doors, placed before the chief excretory paſſages, ſerve for the opening and ſhutting them: a Vertebral branch comes to either as a ſupply; by which it comes to paſs, that beſides the increaſing the forces of the Spirits, their acts flowing from theſe infoldings, become in ſome meaſure ſpontaneous. By what means and for what end, the nerve aſcending from either infolding, is beſtowed on the ſtraight Inteſtine, was ſhewn but now. Moreover, two deſcending on both ſides, are carried into the neck or porch of the Womb, *Fig.* 11. *e. g.* Without doubt, whatever of ſenſe or motion is made about the Venereal acts, is owed to the influence of the Spirits through theſe Nerves. In Men the delightful profuſion of the Genital humor, and in Women the no leſs pleaſant reception of the ſame depends on the action of thoſe nerves. Laſtly, from

from the ſame infolding another nerve deſcending and broken into certain ſhoots, is diſtributed on both ſides into the Bladder and its Sphincter, *Fig.* 11. *f.* Certainly by theſe nerves the buſineſs of making water is performed, and when at any time the ſame is painful, the troubleſom ſenſe is impreſſed on them. But foraſmuch as the nerves dedicated to the ſeveral Excretions proceed on both ſides from the ſame infolding, therefore the acts of them all are in ſome meaſure alike among themſelves, ſo indeed, that if any excretory paſſage ſhould be weak or ill affected, it ſends forth its charge which it ſhould keep, whether it will or no. This is ſo well known, that there is no need to illuſtrate the matter with inſtances.

Theſe Nerves and Infoldings being ſo made, there is not much buſineſs beſides left for the intercoſtal pair. About the beginning of the *Os Sacrum*, both Trunks inclining mutually one to the other, communicate among themſelves by a croſs ſhoot or two, then they end in very ſmall Fibres, which are diſtributed into the Sphincter of the *Anus*, *Fig.* 11. *q. r. s.* Here the intercoaſt pair is after the ſame manner, as we have obſerved concerning the wandring pair; to wit, either nerve being brought to the end of its courſe, before they enter upon their laſt task, incline themſelves to mutual embraces. Concerning the laſt offices of either pair, this Conformity may be alſo noted; that whenas the *Viſcera* dedicated to Chylification, to wit, the Ventricle and Inteſtines, are ſtill continued to the laſt by the ſame paſſage and the ſame perpetual cavity or hollowneſs; the firſt doors of this Cavity, to wit, the Orifices of the Ventricle, are kept by the loweſt branches of the wandring pair joyned among themſelves; but before the laſt door of the ſame, to wit, the *Sphincter* of the *Anus*, the extremities of the intercoſtal pair, alſo before joyned among themſelves, are placed. But to this part, as if it had never provided enough for it, beſides the nerves ſent hither from either infolding next above, and theſe extreme productions of the intercoſtal pair beſtowed on it, a branch alſo and certain fibres from the Vertebral nerve are inſerted, *Fig.* 11. *i. k.* By the acceſs of which it comes to paſs, that the ſhutting and opening of this door-keeping Muſcle becomes ſpontaneous. Truly many nerves, and thoſe of a diverſe kind, are diſtributed into the *Sphincter* of the *Anus*, to wit, becauſe the nutritious Juyce and its ſtinking recrements, like a certain Chymical matter, are digeſted within the Inteſtines, as it were within a *Matrace*; therefore Nature, which beſt underſtands Chymiſtry, is very careful about the well-ſtopping the mouths of the Veſſels.

From the ſame Nerve, *viz.* the laſt Vertebral, out of which a branch diſperſes fibres into the *Sphincter* of the *Anus*, two other Nerves proceed, which are carried into the Yard, *Fig.* 11. *l. m.* The greater of theſe, which is very large and long, is diſtributed into the nervous Body of it; the other leſſer, into its Muſcles. This member, becauſe it receives nerves only from the ſpinal Marrow, according to our Hypotheſis, ought to ſwell up and to be moved only at the ſpontaneous pleaſure of the will: but that oftentimes, by reaſon of the ſwelling up of the Genital ſeed or humor, it is erected and blown up with Spirit, whether one will or no, that is cauſed chiefly for this reaſon, Becauſe from this Vertebral pair, from whence the nerves of the Yard ariſe, a nervous proceſs is ſtretched out into the Vertebral pair next above it; in which the infolding, placed in the Tunnel, imparting nerves to the *Proſtatæ*, is radicated, *Fig.* 11. *I. K.* into which infolding alſo a noted nerve from the intercoſtal pair is implanted. When therefore a communication is had between the *Proſtatæ*, which depend much on the intercoſtal Nerves and the Yard, (by reaſon of the roots of either being joyned together by the nervous proceſs) it comes to paſs, that the action of this follows the affection of thoſe parts: but thoſe parts, *viz.* the *Proſtatæ*, are apt to be moved not only by the turgeſcency of the Seed, but alſo by the paſſage of the intercoſtal Nerve are wont to be irritated with too unſeaſonable an action, according to the impreſſions made by the Senſes or the Brain; into the conſent of which preſently the Yard is excited.

Concerning the Nerves which belong to the Teſticles, here is not much to be ſpoken; for we have often ſought in vain for a great company of nervous paſſages in them: I have very diligently ſearched ſometimes in Man, alſo in a Fox, Dog, Calf, and likewiſe in a Boar and Monkey, but could never find belonging to them but one nerve carried from the Vertebral pair, which alſo for the moſt part is beſtowed on the Cremaſteral Muſcle, *Fig.* 11. *M.* ſo that, although an excellent humor is prepared within thoſe parts, yet it doth not eaſily appear, that its matter is derived thither through the nerves; for we think the Genital humor is no more diſpenſed by

the

the nerves than the nutritious. For truly it ſeems, that the Arteries inſtil a ſpirituous liquor into the Teſticles after the ſame manner as in the Brain; wherefore in their neighbourhood theſe ſanguiferous Veſſels being very much divaricated or ſpread abroad, are turned about into little ſerpentine chanels, whereby they ſubtilize the humor deſtinated to the Teſticles, and inſinuate it, having put off all thickneſs and Feculency, and being truly ſublimated, into their ſubſtance; becauſe there, as within the Cortex of the Brain, the ſpirituous liquor being imbued with a volatile Salt implanted in the part, paſſes into the moſt noble *Clyſſus*, *viz.* the Genital humor. But here is not a place to diſcourſe more largely of the nature and origine of the Seed: yet becauſe it is commonly objected, That the Seed is made of the nervous Juyce and plenty of Spirits fetched from the Brain, and therefore a large expence of it doth induce quickly on the Brain and Nerves a great debility and enervation; I ſay, this comes to paſs, becauſe after great profuſions of the Seed, for the reſtauration of the ſame humor, (of which Nature is more ſolicitous than for the benefit of the individual) preſently greater Tributes of the ſpirituous Liquor are required from the blood to be laid up into the Teſticles: wherefore the Brain is made languid, being defrauded of its due ſtock and afflux of the ſame ſpirituous liquor; and the Spirits influencing it and the nervous *Syſtem*, becauſe they are deficient in the Fountain it ſelf, are very much depauperated and become flagging. Beſides we may add, That the animal Spirits alſo which actuate the *Proſtatæ* coming from the ſpinal Marrow, are conſumed about the Venereal acts very much; ſo that the Loyns are alſo enervated for this reaſon.

CHAP. XXVIII.

Of the Spinal Nerve an Acceſſory to the wandring Pair; alſo of the Nerve of the Diaphragma.

After we have unfolded the Nerves of the wandring and intercoſtal pair, which being Executers of the involuntary Function, are ſtretched out to the *Præcordia* and all the *Viſcera* of the middle and lower Belly, and alſo to ſome other parts: Next to theſe follow ſome other Nerves communicating with the aforeſaid in their beginning, or in the exerciſe of the ſame office, *viz.* the ſpinal Nerve and the Nerve of the Diaphragma; of which we will ſpeak in order.

We have already ſhewn, that the Nerve of the wandring pair in the beginning is made up of numerous Fibres: to which is joyned another noted Nerve ariſing from afar, and being ingraffed with them, goes forth together with them out of the Skull. Concerning this Nerve, becauſe the beginning and diſtribution of it being very irregular, have not as yet been noted by other Anatomiſts, it may ſeem worth our labour to make a little more diligent inquiry. Therefore if we would ſearch into the beginning of this nerve, that is found beginning with a ſharp point in the ſide of the ſpinal Marrow nigh the ſixth or ſeventh *Vertebræ* of the Neck, *Fig.* 12. *C. C.* But being increaſed in its aſcent, is no where inſerted into the medullar Trunk, but in its whole tract on both ſides leans on its ſide, to which it is knit by certain admitted Fibres towards the ſuperficies. This ariſing up from the Neck after this manner, and being carried within the Skull, is joyned to the Fibres of the wandring pair, and is ingraffed with them ſeeming to grow together into one Trunk, and goes out with them at the ſame hole from the Skull; which being paſſed through, the ſpinal Nerve preſently departing from the Trunk of the wandring pair, is at length reflected outward, *Fig.* 9. ♀. ♂. This ſtranger or travelling nerve after a ſhort commerce having left his companion, is carried upon the Muſcles of the Neck, to which it imparts ſome ſhoots, and is inoculated with a certain ſhoot of the tenth pair; but from thence being carried on further, it goes alone by a long paſſage, till it comes to the Scapular Muſcle, on which it is almoſt wholly beſtowed, *Fig.* 9. ☽. This nerve is found conſtantly, not only in Man and four-footed Beaſts, but alſo in Fowls and Fiſhes; and in theſe it ſeems to be deſtinated inſtead of Arms, and for the moving of their wings and fins.

Concerning the uſe of this Nerve, and the reaſon of its irregular beginning, we ſhall

ſhall conjecture after this manner: Foraſmuch as that is deſtinated for the performing the motions of the Muſcles belonging to the Arms and Neck, therefore it ought to ariſe out of the ſpinal Marrow: but that it is not carried by a direct and near way into its Province, but being carried about by a long compaſs before it enters upon its task, communicates in its beginning with the nerve of the wandring pair; certainly this ſeems to be done, to the end that this Spinal nerve, being carried into the parts of the wandring pair, might perform the acts of the Function only involuntary. And indeed it may be obſerved, That beſides the ſpontaneous motions wherewith the Neck and Arms are wont to be imployed with the previous intention of doing this or that thing, thoſe parts alſo, before any other member, are affected with pathetick and ſudden motions, according to the force of the Paſſions, the animal not being conſcious of it. For almoſt all living Creatures do not only turn about their necks at any noiſe to behold whatever might cauſe fear; but they being any ways affrighted in the twinkling of an eye fly away, their feet, wings, fins, or other part anſwerable to them, being ſet into a rapid motion. The Neck and the Arms are pliable or obſervant, not only to fear, but in like manner to the other Paſſions. For brute Animals, as well as Man, being puffed up with pride or anger, (as we have elſewhere intimated) have their Necks ſwollen, and their Creſts lifted up: But as to Man, his hands and arms are ſo obſequious to the Paſſions, and almoſt to all the conceptions of the Brain, that they are continually agitated in the doing of any other thing with various geſtures, whereof we are ignorant or not willing them: we ſcarcely think or ſpeak any thing but at the ſame time the hands are flung out here and there; and whilſt the Tongue heſitates or ſticks, or the words at it were ſtick between the Jaws, the right hand is exerciſed, as if by its geſture it were endeavouring to draw out more ſwiftly the ſence of the mind. Truly that theſe parts, to wit, the Hands and Arms, do ſo nearly conſpire with the Affections of the Brain and Heart in their motions in ſome meaſure in all living Creatures, but more eminently in Man, the cauſe ſeems to be this nerve's coming from the ſpinal Marrow to the beginning of the wandring pair, and communicating with its nerves, and receiving from them as it were the note or private mark of the involuntary Function.

So much for the ſpinal Nerve, which alſo like a ſhrub, growing from other ſhrubs, hath no peculiar origine, but having received various fibres, is radicated for the greateſt part in the ſpinal Marrow, and (as hath been ſhewn) partly in the nerve of the wandring pair. Concerning the nerve of the Diaphragma, (of which we ſhall ſpeak next) many things occur no leſs worthy remarking. As to its beginning, it may be obſerved, That it ariſes from the brachial nerves with a double or triple root; to wit, two or three ſhoots going out of the aforeſaid nerves, grow together into the ſame Trunk, which is the nerve of the *Diaphragma*. In man its firſt ſhoot, which is alſo the greateſt, is produced out of the ſecond Vertebral nerve; and when the firſt brachial nerve ariſes from the ſame handful of Vertebral nerves going out at this place, the aforeſaid ſhoot is rooted in its origine: wherefore, when in Brutes the firſt brachial nerve ariſes from the fourth or fifth Vertebral, the nerve of the *Diaphragma* alſo begins its riſe far lower: two other ſhoots ariſe out of the ſame ſtocks of the brachial nerves which follow next, *Fig.* 9. *Y.* φ. But the Trunk which is made out of theſe ſhoots goes forward ſingle through the paſſage of the Neck and the cavity of the *Thorax* without any branching forth, even to the *Diaphragma*, *Fig.* 9 χ. where being at laſt ſtretched out into three or four ſhoots, it is inſerted on either ſide to the fleſhy or muſculous part of it: ſo that, becauſe the *Diaphragma* is a Muſcle, and performs both its motions, to wit, *Syſtole* and *Diaſtole* by its own Fibres, the office of either nerve is only to carry bands or forces of animal Spirits requiſite for the indiſcontinued action of that part, and alſo to convey thither the Inſtincts of the Motions variouſly to be performed.

As to the firſt uſe of this Nerve, *viz.* for the paſſage of the animal Spirits, the buſineſs is performed in this Muſcle, as it is in the Heart. The Spirits flowing into the *Diaphragma* by the nerves, receive ſubſidiary Forces, to wit, a ſulphureous Copula from the blood, upon whoſe exploſion being ſtill iterated by turns, and the receiving of new, the action of this perpetual moveable depends. Concerning the Inſtincts of the Motions tranſmitted by the paſſage of this double nerve, we may obſerve, That they are, eſpecially in man, of a double kind: *viz.* either the action of the *Diaphragma* merely natural for the performing of Reſpiration, is continually reciprocated according to the uſes of the Heart and Lungs, and altered many ways in their

their tenour according to their needs, or ſecondly, a certain irregular and unuſual motion of the *Diaphragma* is wont to be excited at the beck of the Appetite, or from the inſtigations of other parts; for the which, whilſt the reſt of the Organs of Reſpiration are compelled to conſpire, the act it ſelf of Reſpiration becomes after a various manner interrupted or unequal.

1. As to the firſt of theſe, *viz.* the unforced motion of this Muſcle, it may be obſerved, That the *Diaphragma*, with the Muſcles of the *Thorax* and the parts of either, conſpire in their motion with the action of the Lungs and Heart: and that between all theſe ſuch a joynt action may be ſuſtained, it is obſerved, That three or four branches are ſent out from the Vertebral nerves, in the branches of which the nerve of the *Diaphragma* is rooted, into the intercoſtal infolding, *Fig.* 9. Θ. and whereas from this infolding the nerves are carried into the Muſcles of the *Thorax*, by this means a communication and conſent of action is effected between theſe and the *Diaphragma*. Therefore the *Diaphragma* drawing with it ſelf the Muſcles of the *Thorax*, by reaſon of other nerves, conſpires with the *Præcordia*. Theſe in man going from the intercoſtal nerve, are already deſcribed; and in Brutes from the lower infolding of the wandring pair a nerve is ſent down into the infolding of the *Thorax*, to which beſides ſo many ſhoots and certain fibres reaching forth into the nerve of the *Diaphragma*, are inſtead of ſuch a commerce.

2. The Anomal and irregular motions of the *Diaphragma* proceed from various cauſes and from the divers inſtigation of other parts, which alſo in man become much more ſignal than in brute Animals; becauſe in him the communication is notable by the nerves reaching out from the Cervical infolding of the intercoſtal pair into the nerve of the *Diaphragma*; which kind of infolding and nerves are wanting in Brutes.

As to the Species themſelves of irregular motions into which the motion of the *Diaphragma* is wont to be perverted, it may be obſerved, That we are able at our pleaſure to ſtop breathing or reſpiration for ſome ſpace, and preſently to take it or draw it out. In laughing, weeping, and ſinging ſometimes the *Syſtole*, ſometimes the *Diaſtole* becomes ſtronger, and is made frequenter upward or downward with a repeated ſhaking; which ſort of actions of it are made by reaſon of thoſe near commerces had between the nerve of the *Diaphragma* and other reſpective parts of the Breaſt and Face: yea indeed from hence it is effected, (as we have already ſhewn) that man is peculiarly a laughing Creature. Further, (which we have ſhewn elſewhere) from the Sympathy which happens between the parts of the Mouth and Face with the *Diaphragma* by thoſe nerves, a good reaſon of ſneezing may be given, and that Problem of *Ariſtotles* eaſily ſolved, to wit, why men alone, or chiefly before other Creatures, ſneeze: For the act of ſneezing ſeems to be made for this end, that man may not only clear his Noſe, but that all Torpor or heavineſs may be ſhook off for him from the neighbouring Organs of the Senſes, yea and from all the fore-part of the Brain: which thing eaſily ſucceeds, if the Membranes and nervous paſſages beſmearing the Noſtrils and the Sieve-like Bone, like the holes of a Sponge, being ſtrongly wrung forth or ſqueezed together, be forced to ſhed forth their moiſtures; for theſe parts ſo emptied, preſently like a preſſed Sponge, receive other humors, to wit, thoſe coming from the neighbouring parts. In the mean time, that the watry heap ſo laid up about the caverns of the Noſtrils, may be emptied, it ought to be carried away, or wiped out from thence by a vehement blowing of the Air or breath. Wherefore it is obſerved, That whilſt the inward parts of the Noſtrils being very ſenſible, begin to be wrinkled together from ſome ſharp thing pulling or pricking them, and by that means to draw out the watry humor preſently by reaſon of the paſſage from thence by the branches of the fifth pair into the intercoſtal Trunk, and from thence by the paſſage of the nerves which are extended from its Cervical infolding into the nerve of the *Diaphragma*, the conſent of the ſame Action or Convulſion is produced even into the croſs bound or Midriff; ſo that by the ſame Act as it were with which the Noſtrils are wrinkled, the *Diaphragma* alſo with the *Diaſtole* being ſtronger and longer draw out, is depreſſed, that the Breaſt being dilated as much as may be, the Air may be the more copiouſly inſpired. Then as ſoon as the Spaſm or Convulſion of the Membranes, drawn together within the Noſtrils and fore-part of the Head, begins to remit, preſently the Midriff leaping back with a force, cauſes the inſpired Air to be violently exploded or driven out, which ſtrongly wipes away and carries forth with it the humor preſſed out within the caverns of the Noſtrils.

We yet ought to inquire concerning the Nerve of the *Diaphragma*, what is the reaſon, that it always proceeds from the Brachial nerves, and why it doth not rather ariſe immediately from the ſpinal Marrow. Truly from hence it ſeems to follow, that the motion of the Arms in ſome ſort reſpects the action of the *Diaphragma*; or on the contrary, that this depends on that. Indeed between theſe two a certain reſpect or habitude happens; which eaſily appears by this Argument: The Arms or fore Legs in all Creatures are made for labour and hard exerciſe; becauſe by the force of theſe men fight, and perform the moſt hard and laborious things, and Brutes run and aſcend the moſt ſteep places with great pains. But it is very well known, that by too much labour and over vehement motion of body, the act of Reſpiration is very much increaſed, ſo that the breath almoſt fails, and is oftentimes in danger to be loſt. The reaſon of this is, becauſe by great exerciſe the blood is too much forced into the boſom of the Heart, which, leſt it ſhould ſuffocate it, that it might be emptied into the Lungs, very frequent and difficult Reſpiration is inſtituted. Therefore from hence may be inferred, That the exerciſes of the Body ought to be regulated according to the ſtate of the *Præcordia*; or that the motion of the Arms ſhould obſerve the action of the *Diaphragma*; *viz.* leſt they being ſtirred by a violent motion, cauſe the blood to be driven more into the boſoms of the Heart, than the *Diaphragma* inſtituting a moſt frequent Reſpiration, can draw from thence into the Lungs. That this Rule may be perpetually obſerved of all living Creatures it is ſo provided, that the nerve of the *Diaphragma*, chiefly conducing to Reſpiration, ſhould be tyed, as it were a bridle, to the Brachial nerves, which are the principal in the motion of the Body, and ſo might timely warn theſe, if unmindful of their duty, and as ſoon as breath fails, ſhould command them to deſiſt from further moving the Body. Wherefore we obſerve, when at any time labouring Cattle are urged beyond their ſtrength in labour or motion, oftentimes either ſome deadly hurt of the heart follows, or elſe ſome uncurable diſeaſe of the *Diaphragma*; for by ſuch immoderate labour, either the Beaſt languiſhing quickly dyes, when it is commonly ſaid, that his heart is broke; or elſe the tone of the *Diaphragma* being wholly broken, Reſpiration ever after becomes painful and difficult: which is wont to happen ordinarily to Horſes, who are driven into too rapid a courſe with a full Belly.

CHAP. XXIX.

Of the Reaſon of the difference that happens between the Nerves of the Wandring and Intercoſtal Pair in Man and brute Beaſts; alſo of the other Pairs of the Nerves ariſing both within the Skull, and from the Spinal Marrow: alſo ſomething of the Blood-carrying Veſſels which belong to the Spinal Marrow.

THus far we have deſcribed all the Nerves ſtretching out to the *Præcordia* and *Viſcera*, alſo to moſt of the other parts, which are the Organs of the involuntary Function, according to the manner by which they are wrought in man; and we have ſhewn their Offices and Uſes, and the Reaſons of the moſt noted appearances in all. Before we proceed to the other Conjugations of the Nerves, it behoves us to ſhew with what difference the aforeſaid Nerves are found in brute Beaſts, and for what end ſuch a difference is ordained.

It was already intimated, That the Trunk of the wandring pair in four-footed Beaſts doth ſend forth to the Heart and its Appendix more nervous Veſſels than in Man. The reaſon of which is obvious; becauſe the Cardiack nerves in Brutes proceed almoſt only from this pair, and ſcarce at all from the intercoſtal; wherefore when they are only of one origination, therefore more are required, all which notnotwithſtanding are much fewer than the ſame are in Man from a double ſtock, *viz.* being carried from both the Nerves: foraſmuch as Beaſts want prudence, and are not much obnoxious to various and divers Paſſions, therefore there was no need that the Spirits ſhould be derived from the Head into the *Præcordia* by a double paſſage, *viz.*

viz. that one ſhould be required for the exerciſe of the vital Function, and the other for the reciprocating impreſſions of the Affections; but that it may ſuffice, that all thoſe deſtinated to every one of their offices, may be carried ſtill in the ſame path.

In moſt Brutes the intercoſtal Nerve goes alone from the Ganglioform infolding of it almoſt without any branching to its infolding of the *Thorax*: in which paſſage however it is not always after the ſame manner in all; for in ſome it is carried ſingle and apart from the Trunk of the wandring pair, nor doth it communicate with it in its whole journey, unleſs a little higher by a ſhoot ſent down from the Ganglioform infolding: but in many the intercoſtal Nerve paſſes preſently from its Ganglioform infolding into the neighbouring infolding of the wandring pair, *Fig.* 10. *C.* where, when both the nerves ſeem to cloſe together, from thence both being involved under the ſame common incloſure, as it were one Trunk, they are carried together till it comes over againſt the firſt Rib, and there an infolding being made, the intercoſtal nerve, departing from the wandring pair, is carried into the infolding of the *Thorax*; and the other nerve alſo is ſtretched between this and that infolding: which nerves, when one is carried under the other above the Artery of the Chanel-bone, making as it were an handle, ſtraiten its Trunk, *Fig.* 10. *g.*

Although the intercoſtal Nerve is carried from the Throat to the top of the *Thorax* under the ſame ſheath with the Trunk of the wandring pair, yet it is not united to it; but they remain diſtinct ſtill both of them in the whole tract, and the Membrane being diſſected, they eaſily ſeparate one from the other, unleſs they be knit together by ſome fibrils ſent from one another in ſome places: but foraſmuch as by this means the intercoſtal nerve being joyned to the Trunk of the wandring pair, goes under its cover, it ſeems to be ſo made only for its ſafety and better paſſage: wherefore in ſome perhaps where the intercoſtal Trunk is greater, or the courſe of its paſſage ſhorter, where ſuch a ſafeguard is not needful, it deſcends alone. We have ſeen this Nerve covered with the ſafeguard of the wandring pair of one ſide, and in the other to have gone out by it ſelf alone.

Whether the intercoſtal Nerve departs from the lower Infolding of the wandring pair or not, however a branch is ſtretched out between this infolding and that of the *Thorax* in many, perhaps in all brute Beaſts, which in its paſſage binds about the Vertebral Artery, whereby the *Sympraxis* or joynt Action between the *Præcordia* and the exterior Organs of Reſpiration is ſuſtained: yea from this lower infolding of the wandring pair ſometimes we have obſerved a ſhoot and fibres to be carried to the beginning of the Brachial branch, in which the nerve of the *Diaphragma* is rooted; alſo ſometimes, though rarely, we have ſeen ſome ſhoots ſent from the infolding of the *Thorax* towards the Heart and its Appendix. In a Monkey above this infolding of the *Thorax*, as we have intimated before, were ſome ſhoots and ſmall branches reaching from the intercoſtal nerve towards the *Præcordia*.

We may take notice concerning thoſe Nerves below the *Præcordia*, diſtributed every where into the Ventricle and the lower *Viſcera*, that there is ſcarce any difference of them in Man and Beaſts. The nerve of the *Diaphragma* is placed lower in four-footed beaſts: the reaſon of which is, becauſe the Brachial nerves, out of which that ought to proceed, ariſe lower; to wit, becauſe Brutes have longer necks, as if deſtinated to the yoke. Theſe things being thus premiſed concerning the difference of the Nerves in either Species, it remains that we paſs on to the unfolding the remaining pairs of them.

Therefore of thoſe ariſing within the Skull, the ninth pair is made up of many Fibres alſo in its beginning, (as was ſhewed before) out of which being gathered together one Trunk being made is carried towards the Tongue, through whoſe whole ſubſtance, to wit, from the bottom to the top, having paſſed, it diſperſes in its whole paſſage ſmall ſhoots on either ſide, *Fig.* 9 *&c.* So that nothing is more obvious than that this nerve performs the motions of the Tongue requiſite for the articulation of Sounds, as the nerves of the fifth pair ſpread into this member, ſerve for the diſtinguiſhing of Taſtes; for the exerciſe of either Faculty, *viz.* both motive and ſenſitive, the texture of the Tongue being notedly fibrous, hath the virtue of a double Organ; therefore by the two nerves, beſides the ſupplements of Spirits, are carried both the Inſtincts of the Motion and the ſenſible Impreſſions.

That the aforeſaid Nerves of the ninth pair may more eaſily perform the motions of the Tongue, it ſends forth downwards one ſhoot before the entrance of the Tongue, which is united with a ſhoot from the tenth pair meeting it deſtinated to

the *Sternothyroeidal* Muſcle; and the other little branch of the ninth Conjugation is diſtributed into the Muſcles of the Bone *Hyoides*, *Fig.* 9. Θ. ⊙. In truth theſe ſhoots being ſent down as ſo many little ropes, conduce to the moving of the Muſcles, which are fixed to the bottom of the Tongue, which Muſcles being placed as ſo many Props to the Tongue, do facilitate its motion.

The Nerve of the tenth pair, although it may ſeem to ariſe within the Skull with many little Fibres alſo, yet being ſent down from thence into the bony Cloiſters of the *Spine*, not ariſing but within the firſt and ſecond *Vertebræ*, it is carried without. Preſently after its entrance it ſends forth two nerves into the infolding of the intercoſtal nerve; for what end hath been already ſhewn: But its chief Trunk ſpreading downwards, and receiving a ſhoot produced from the ninth pair, is beſtowed on the *Sternothyroeidal* Muſcle. Moreover, this nerve reflects branches outwards, which are diſtributed into the Muſcles of the Neck reaching out towards the hinder part of the Head; ſo this pair, as if it were only of the number or rank of the Vertebral nerves, imparts ſome branches to the intercoſtal nerve, and all the other ſhoots and branches of it ſerve for the performing of the motions of the Muſcles of the Neck, *Fig.* 9. *H.* ✳. □. △.

So much for the Nerves ariſing within the Skull, which (as was ſhewn) having their being from the parts of the Brain or Cerebel, are deſtinated to the offices of the ſpontaneous or the involuntary Function, and are chiefly diſtributed into the Organs of the Senſes or the *Viſcera* of the vital and natural Faculty. There remain many other Conjugations of Nerves, the roots or beginnings of which conſiſt in the ſpinal Marrow, which is only the exterior production of the oblong Marrow. Theſe ſpinal Nerves, beſides ſome branches that they beſtow on the intercoſtal pair, are imployed almoſt wholly on the muſculous ſtock, and the office of them is to carry outwardly the forces of the Spirits and the Inſtincts of the Motions to be performed, and to convey inwardly the impreſſions of ſenſible things. Foraſmuch as the ſpinal Marrow ſeems to be derived from the Brain, and is as it were a broad and high road produced or leading from the ſame, without any paths or tracts inſerted to it from the Cerebel, therefore the animal Spirits flowing within its nerves, do almoſt wholly execute the Acts of the ſpontaneous Function.

To deſcribe all the ſeveral pairs of the ſpinal Nerves, and to rehearſe all their branchings, and to unfold the uſes and actions of them, would be a work of an immenſe labour and trouble: and as this *Neurologie* cannot be learned nor underſtood without an exact knowledge of the Muſcles, we may juſtly here forbear entring upon its particular inſtitution: but it may ſuffice concerning theſe nerves and their medullar beginning, that we advertiſe only in general what things may occur moſt notable and chiefly worth taking notice of.

As to the Nerves therefore produced out of the ſpinal Marrow, it may be obſerved, That in both ſides of it, nigh the outward margine or brim, four or five Fibres ariſe in the ſuperior brim, and as many in the inferior: either maniple or handful paſs through with diſtinct Fibres the *Pia Mater*, or the loweſt Coat of the ſpinal Marrow, which is as it were the common ſheath of them all; but afterwards the Fibres paſſing through the third Membrane of either margine, (for three cloath the ſpinal Marrow) they joyn together, and having cloathed themſelves with a Coat gotten from the ſecond Membrane, they become as it were one Trunk; which Trunk going out at the ſpace between the knot of the *Vertebræ*, is again divided into many nerves deſtinated to ſeveral parts. After this manner in the whole tract of the ſpinal Marrow, the Vertebral nerves have their birth; but in thoſe places where the *Brachial* and the *Crural* nerves go out, both the thickneſs and the breadth of the ſpinal Marrow are increaſed, and alſo the handfuls or bands of the Fibres are larger. All theſe are well repreſented in *Fig.* 12.

The Brachial Nerves are not only far greater than the Vertebrals, ſo that they appear as it were large and broad nervous chords; but that they may conſpire together, and ſerve for the ſtrong motions of the Arms, or the fore Legs of Beaſts, it is obſerved, That very many of them are knit together by the croſs nervous Proceſſes. Theſe Proceſſes in four-footed Beaſts (the fore Legs of whom are deſtinated for unweariable pains and difficult labour) are produced croſs-ways after a curious manner, as may be diſcerned, *Fig.* 10. *l. l.* The uſe of theſe ſeems to ſuſtain not only the conſent of action in many nerves together, but alſo their mutual ſtrength; that ſome bands of Spirits might awaken or ſtir up others, and for the exerciſing ſtrongly the locomotive

tive force, they might mutually ſupport and relieve one another. And not much unlike this, the buſineſs is about the Crural Nerves; where nervous cords ſignally large, being produced from the Junctures of the *Vertebræ*, whilſt they deſcend towards the Thigh, they which are above receive in their whole tract the nervous Proceſſes which are ſent out ſtill from thoſe below, *Fig.* 11. *p. p. p.*

We may yet take notice farther concerning the ſpinal Marrow, that as it ſends out Nerves by bands, and as it were by troops, in an orderly ſeries and military order; ſo its ſanguiferous Veſſels are diſpoſed with no leſs ſignal artifice. For thoſe which are carried in the ſuperficies of the ſpinal Marrow, and the Arteries, Veins, and other Sanguiducts, which are nigh its compaſs, do contain ſome things more rare and highly worth the noting.

In the firſt place we may obſerve, That the blood-carrying Veſſels do cloath the whole ſubſtance or frame of the ſpinal Marrow, as well as the oblong Marrow with a thick ſeries of ſhoots; which may be made more manifeſt to any one, if firſt of all Ink were injected into the Vertebral Artery; for from ſuch an injection often repeated, it will eaſily appear, that the infoldings of the Veſſels do cover as it were in the ſhape of a Net, the upper tract of the Marrow. But by what means theſe Veſſels proceed on both ſides from the Trunk of the Vertebral Artery, and alſo the blood-carrying Veins, which are deſtinated to the whole ſpinal Marrow, and the inferior portion of its arterious paſſages, doth not ſo plainly appear; becauſe the bony Cloiſters of the *Vertebræ* are not broken through without much labour, eſpecially in grown up living Creatures; and in that work the beginnings and branchings out of very many Veſſels are wont to be blotted out: But that we might more accurately ſearch into theſe hid things, we made the Diſſections of ſeveral *Embryons*, in which we were able to diſſect the *Vertebræ* as yet ſoft, and to take out of them the Marrow whole, and to look more narrowly into all the receſſes of the Bones: further, that all the tracts and branchings out of them might be the better perceived in all the Veſſels, we did caſt in divers coloured Liquors. And we had our deſired wiſh: for preſently we found with much admiration, that thoſe kind of Veſſels, *viz.* Arteries, Boſoms, and Veins, which reſpect the Head, belong alſo to the ſpinal Marrow with no leſs a noted diſpoſition of proviſion.

When we did diſſect the Heads apart from the Spine, we did think, according to the Opinion of the Vulgar, that the Vertebral Arteries did belong only to the Head: and when there did appear in the cut off Trunk of the oblong Marrow three arterious branches (as they are deſcribed above in the firſt and ſecond Table) therefore in the Explication of either Figure we have affirmed the Vertebral Artery to be carried with a triple branch into the hinder part of the Head. But the Vertebral Artery pays to the ſuperior part of the Spine as great Tributes of Blood as to the Head it ſelf; and that middle arterious branch, which is marked in the firſt Figure with the Letter T, in the ſecond with S, doth not aſcend into the Head, but deſcends from that concourſe of Vertebral Arteries towards the Spine, and conveys downward from the common flowing together of the blood there made by many Arteries, the *Latex* for the watring the top of the ſpinal Marrow. Wherefore in this place it ſeems convenient, that we do not only correct that errour of ours, but that we deliver an exact Deſcription of all the Veſſels which are deſtinated to the Spine, *viz.* which contain many wonderful things. As therefore theſe Veſſels are of a threefold kind, *viz.* Arteries, Boſoms, and Veins, we will expoſe each of them particularly; and firſt concerning the Arteries we ſay,

The Arteries which carry the Blood towards the Spine, are diſpoſed after one manner above the Heart, and after another below it. As to the firſt, whereas the Trunk of the *Aorta* being there cleft preſently into many branches, departs from the Region of the Spine, therefore the Vertebral Artery is produced on both ſides from its axillary branches, which aſcending ſtraight into the hinder part of the Head, ſends forth a branch into the meeting together of every *Vertebra*: But below the Heart, foraſmuch as the *Aorta*, in its whole deſcent, lyeth on the Spine, two Arteries are received into the Spine from its bottom nigh its *Internodia* or ſpaces between the knots of the *Vertebræ*; ſo that if the Trunk of the *Aorta* be cut open long-ways, there will appear a ſeries of double holes through its whole tract, after a moſt curious manner, as in the head of a Lamprey.

The arterious Branches which are carried both above and below the Heart towards the Spine, becoming preſently forked, beſtow one ſhoot on the neighbouring Muſcles, and

and another they inſert into the Junctures of the *Vertebræ*; which being carried within the bony Den, is cleft preſently into three branches, two of which are beſtowed on the medullar Trunk, and the other on the Membrane compaſſing about the bony Den before, *Tab.* 13. *Fig.* 3. *a. b. c. d. e.*

As to the ſhoots deſtinated to the medullar Trunk, they preſently tending two ways, and meeting with either maniple or band of nervous Fibres, aſcend towards their beginnings; and ſo one little Artery having got to the ſuperficies of the hinder Marrow, diſtributes into it hairy Veſſels: but the other arterious ſhoot, which is the greater and chiefeſt, as ſoon as it attains the margin of the former Marrow, is carried from thence by an oblique paſſage into the middle fiſſure or cleft of it, where meeting with a ſhoot of the pair of the other ſide, it is united to the ſame, and from that joyning together the arterious Trunk, as it were a common paſſage, and made up of either Vertebral ſhoot, deſcends into that cleft by the open ſpace of one of the *Vertebræ*, and in that ſhort paſſage both diſpenſes little Arteries on either ſide, and alſo inſerts them leaning on the *Pia Mater* more deeply betwixt the ſides of the Marrow: and ſo whereas in the whole tract of the Marrow, the chief Trunk of every Artery is carried into the middle cleft, it ſeems at firſt ſight, as if the ſame arterious Trunk were carried under the whole ſubſtance of the Marrow from the head to the tail, *Tab.* 13. *Fig.* 1. Further, as by a concourſe of ſeveral ſhoots of either ſide, the ſpinal Artery deſcends above the cleft of the Marrow; ſo where the Trunks of the Vertebral Arteries joyn together (which happens to be done ſometimes in the hinder part of the Head above the oblong Marrow, and often in the Neck above the ſpinal) an arterious branch ſomewhat bigger than the reſt is ſtretched out downwards. This formerly (as we mentioned but now) we miſtook for the third aſcending branch of the Vertebral Artery. But I have often taken notice, that in Brutes, where the Vertebral Arteries have met together with an acute Angle above the medullar Trunk, they are preſently, departing one from another, ſtretched out directly to either brim of the Marrow, from whence immediately being bent back, they are carried again into a mutual meeting, ſo that between their two joynings together is made the figure *Rhomboides*, as it is in *Tab.* 13. *Fig.* 1. *C.* The reaſon of which without doubt is this; to wit, that the more rapid courſe of the blood going towards the Head might be hindred by its flood being a little ſpace divided.

The third Branch of either Vertebral Artery being carried into the anterior Cavity of the bony Den, and being preſently made forked, tends to the right and left, and is on both ſides inoculated to the next ſhoot of the ſame ſide and by the croſs proceſs, they of either ſide are united after the ſame manner; and ſo all the Arteries of this cenſe or rank receive one another mutually, as it were links of a chain, in the whole tract of the Spine, and are continued in the ſame bending paſſage. If Ink be caſt into the Trunk of the Vertebral Artery and moſt of the hollowneſſes of the *Aorta*, all theſe Arteries, dyed with the ſame, will appear a pleaſant ſpectacle, like Net-work, as may be ſeen *Tab.* 13. *Fig.* 3.

The top of this arterious Infolding being carried into the Skull, inſerts two ſhoots ſent forth ſtraight into the wonderful Net, and imparts two others going out ſideways on both ſides to the *Dura Mater:* the lower end of the ſame reaching to the *Os Sacrum*, ends in very ſmall Veſſels which ſerve for the Membrane of the Bones.

If it ſhould be asked, For what end theſe Arteries being concatenated with ſuch frequent ingraffings are diſpoſed within the Back-bone: This ſeems to be ſo ordained for three uſes: *viz.* Firſt, Theſe Veſſels (as alſo the paſſages of the Boſoms) are divaricated after this manner with repeated compaſſing about, that a conſtant heat from the blood being ſo turned about, as it were into frequent Whirlpools, might be ſupplied about the compaſs of the ſpinal Marrow, as it were by a *Balneum Mariæ*; even ſuch a manner of office as the *Choroeidal* infolding performs within the infolding of the Brain. Secondly, Care is taken by this means, leſt the blood deſtinated for the ſpinal Marrow, might flow thither too plentifully, or might be defective in its due influx; for the blood being about to flow into the medullar ſtock plentifully, is diverted from the little branches *c. d.* into theſe Emiſſaries *e. f.* and in its defect the ſubſidiary proviſion being called out of the middle infolding through the chanel *e* into the Veſſels *c. d.* is derived into the ſame medullar Trunk. Thirdly, The uſe of this arterious infolding ſeems to be, that the blood may be diſtributed from its paſſages into the Membranes, *viz.* which is carried every where from them through the Capillary Veſſels; the reliques of which alſo are ſupped back by the little chanels ſent out

out of the boſoms. Further, from this Store-houſe, if neceſſity urges, a certain proviſion is had for the wants of the Brain; wherefore from hence the ſmall Veſſels end in the wonderful Net.

So much for the Arteries diſtributed about the *Spine* or Back-bone: the Veſſels of the ſecond ſort are the Boſoms which come between the Arteries and the Veins for the uſe of the ſpinal Marrow no leſs than of the Head it ſelf, and are here ordained with a more curious implication. But the reaſon why boſoms are required to theſe more noble parts, and ſcarce to any in the whole Body beſides, is this; to wit, that about theſe bodies all manner of extravaſation, or any ſtagnation of the blood, might be hindered: but ſometimes the Veins are not ſufficiently emptied, that they may preſently receive from the Arteries the depoſited blood, and ſo may prohibit any flowing out of it; wherefore the boſoms, as more fit receivers, are deſtinated to that office, for that their receptacles are larger and ſoon emptied; and for that reaſon they may more conveniently derive the blood from either medullar ſubſtance, leſt it ſhould overflow it in the Head or Spine.

As to the Figure of the Vertebral Boſom, its paſſages being conform to the arterious infolding, are put under it in the whole tract of the Spine: for after a like manner, in either boſom, which is extended within the cavity of the bony Den, from the hinder part of the Head to the *Os Sacrum*, there is one receiving Veſſel, by whoſe twofold chanels preſently the blood is brought back from either ſuperficies of the Marrow into the boſom, and another carrying back, by whoſe paſſage the ſame is exported into the Veins. Moreover, in many Animals (though not in all) the boſoms on either ſide ſeem to be knit together upon the knots between the *Vertebræ* by the croſs proceſſes, and ſo communicate between themſelves: either boſom in its top is continued into the lateral boſoms of the Head; further, from it on both ſides a paſſage lyes open into the Jugular Vein and into the Vertebral, *Tab.*13. *Fig.*4.

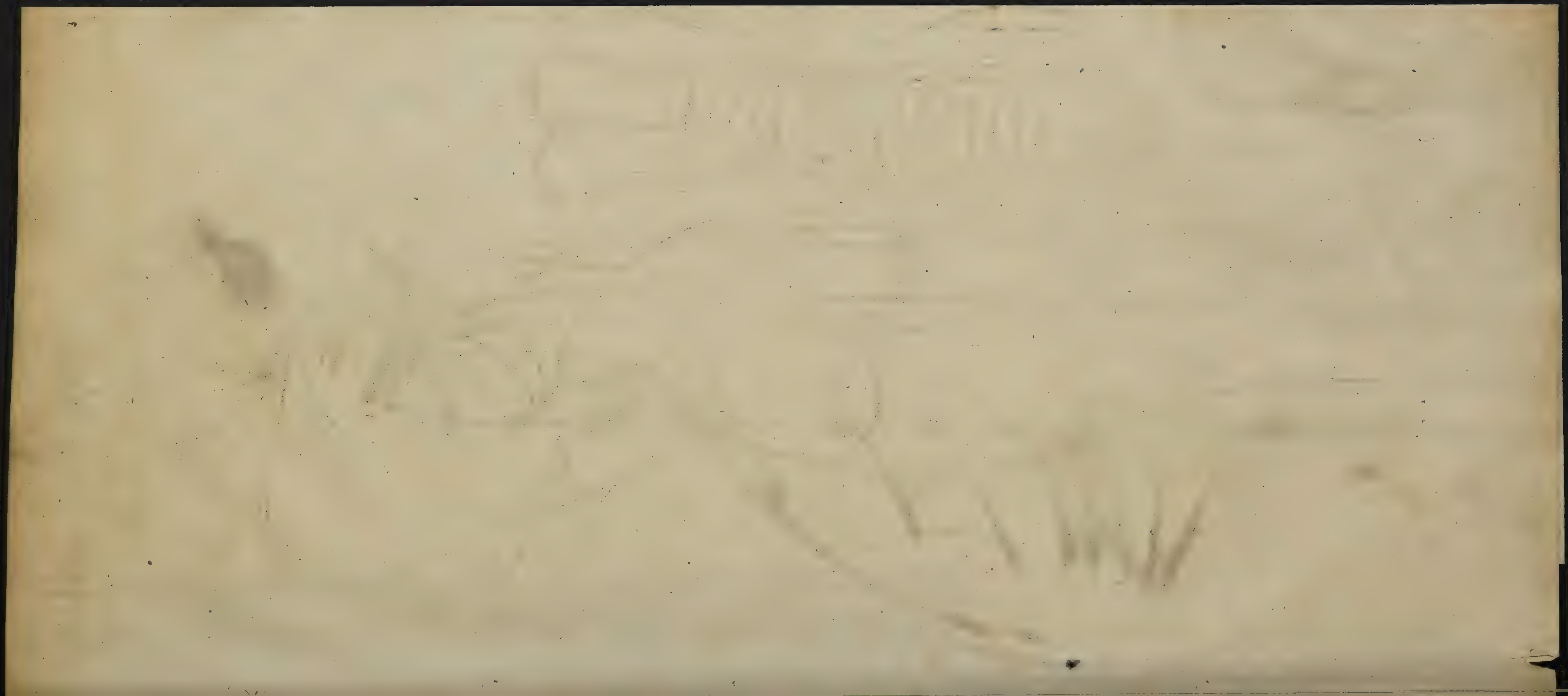
What the uſe of the aforeſaid Boſom is in general was but now intimated; to wit, that the blood depoſited from the Arteries in the ſpinal Marrow, might be preſently emptied from thence, and be retained within the more large Cavities of the Boſoms, till it may be transferred into the Veins being made more empty: But the reaſon of the divers ſorts of implications, and the frequent ingraffings which is found about their little chanels, ſeems to be, that the blood, if by chance it being plentifully heaped up within ſome part of the boſom, ſhould there ſtagnate, or be apt to regurgitate into the Marrow, it might be drawn out by thoſe frequent Emiſſaries here or there into the middle or oppoſite ſide: after a like manner it is with the boſoms about the Spine, as when a Country-man digs in his ground frequent croſs Furrows for the draining away any ſuperfluous moiſture.

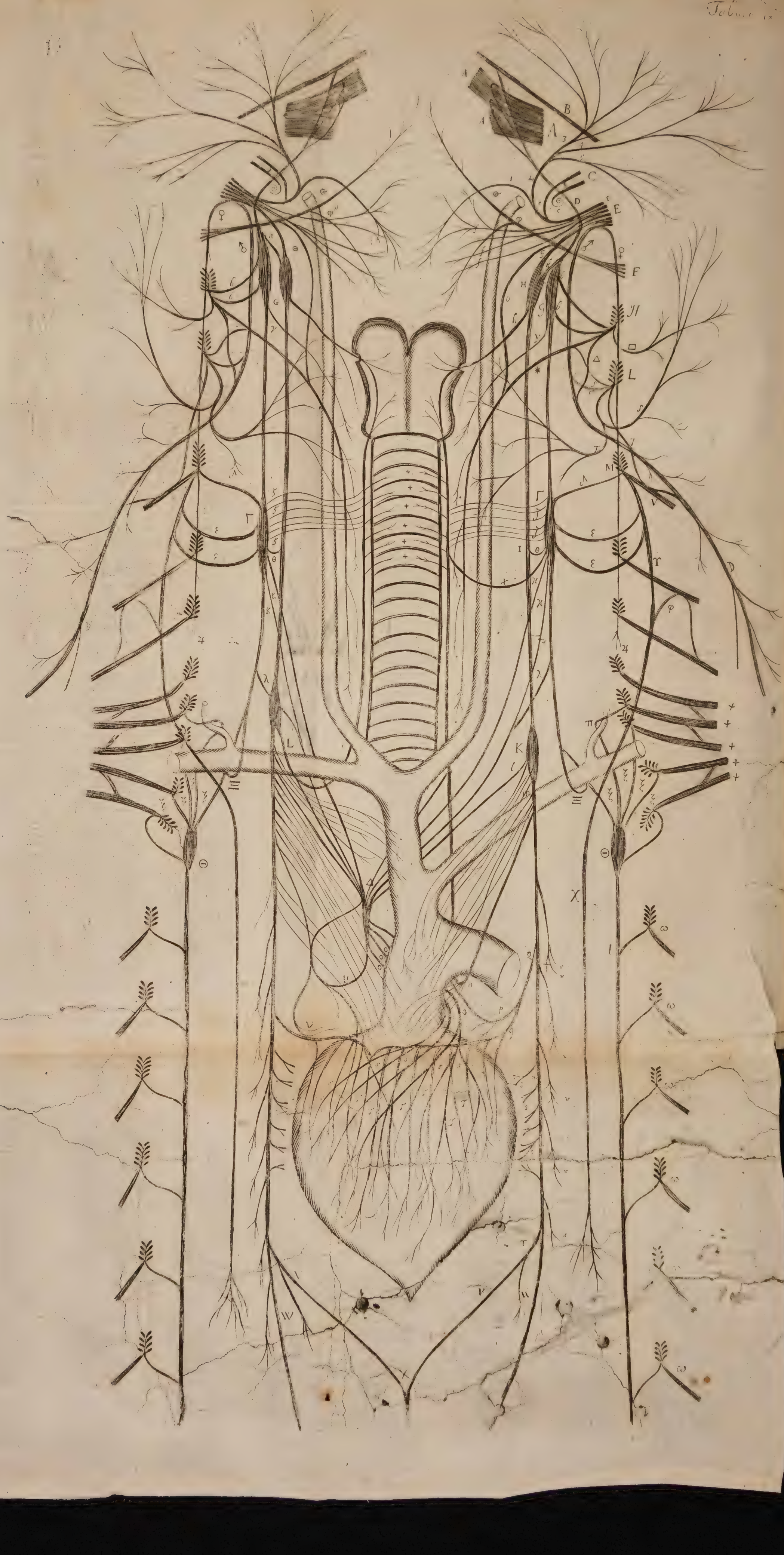
There remains another uſe of the Vertebral Boſoms, of which we made mention before, to wit, that the blood nigh the medullar Body, being brought through their variouſly intorted Meanders, (like the arterious infoldings) might yield heat requiſite for the ſwift paſſage of the animal Spirits, as it were a *Balneum Mariæ*. That the bending tracts and complications of the Boſoms may be the better ſeen, a certain tincture may be caſt into the Vertebral Veins; and preſently that invading the paſſages of the boſoms and marking them, will exhibit the appearance of a long Ladder with many little labels hanging to it.

Yea at length by thoſe little roundles we are led to the third kind of Spinal Veſſels, which are the Veins, into which all the boſoms immediately convey their burden, whereby they being continually emptied, may be ſtill able to receive freſh blood: wherefore the venous branch is ſtretched out by the ſeveral joyntings of the *Vertebræ* into the boſom, which preſently carries away the blood laid up in it, and to be reduced towards the Heart. The Veins deſigned to this office, after the example of the Arteries, are diſpoſed after one manner above the Heart, and after another below it. As to the firſt, a branch going from the Trunk of the *Vena Cava* below the Chanel-bone, or the firſt little Rib of the Breaſt, accompanies the Vertebral Artery, and aſcending by the holes of the Proceſſes between the ſeveral *Vertebræ*, inſerts a little branch to the Boſom, *Tab.* 13. *Fig.* 2. *h. h. h.* Then the top of this Vein being carried towards the hinder part of the Head, is continued into the Trunk of the Boſom, and opened by the other paſſage into the Jugular Vein. But further, as if theſe communications were not yet ſufficient for the draining away the blood, tranſverſe branches alſo are ſtretched out between both Veins, *Tab.* 13. *Fig.* 2. *i. i. i.* So manifold diverting places appear, by which it is enough and more than enough provided, leſt

leſt the blood might flow back towards the medullar Trunk upon any occaſion. Below the Heart, becauſe the Trunk of the *Vena Cava* cannot, as the *Aorta*, immediately lean upon the Spine, and carry ſhoots ſtraight to the ſame, therefore it ſends forth a Vein without a Companion, out of whoſe Trunk forked or twofold branches being ſent forth, go forwards both to the Muſcles of both ſides and to the Spine it ſelf. Below the Kidneys, ſeeing there is a ſpace granted for the *Vena Cava* to be carried nigh the Spine, the *Azygos* Vein ends, and from the Trunk of the greater Vein, as from that of the Artery, the Veſſels belonging to the Loyns immediately proceed.

Theſe things being lately obſerved concerning the blood carrying Veſſels belonging to the Spine and the hinder part of the Head, and here inſerted in the place of an Appendix, ought to be referred to the other Doctrine of this kind, delivered above in the eighth Chapter. In the mean time, that we may return to our purpoſe, to wit, what remains of *Neurologie*, there is not much more to be met with worthy note concerning the Nerves: For they, as to the greater and chief Ramifications, are almoſt conſtantly both in Man and brute Beaſts, after the manner we have deſcribed them. Sometimes it happens, although very rarely, concerning the divarications of the ſmalleſt Shoots and Fibres, that there is ſome variety: but as to the primary Veſſels, and thoſe drawn from them, the Configuration of every pair of Nerves is ſtill the ſame or alike in all. It now remains, that the Theory of the Nerves, hitherto drawn in words, and ſo only objected to the Underſtanding, may alſo be ſhewn to the Senſe, which will make it clearer. Wherefore we have taken care, that the ingraven Delineations of the wandring and intercoſtal pair of Nerves, and alſo of others which are of chief note, and of the Spinal Marrow it ſelf be plainly exhibited. The Figures of theſe, although taken from a dead Example, yet after many Diſſections and a frequent comparing them together according to their ſeveral parts, they are deſcribed as if from the life; the Lineaments of which with *Characteriſtical* Notes, that they may be the better and more diſtinctly perceived, and a large draught of every Figure, equal almoſt to the Scheme of Nerves in their animated Body, we have cauſed to be cut: further, becauſe the Contents of either ſide and of the Cavity between, cannot be at once deſcribed in their proper ſituation; therefore here it is ſuppoſed, That the *Spine*, with the oblong Marrow, or the whole medullar Stock, cut in the midſt is rolled out, and both ſides of it, with the pairs of the Nerves ariſing in the whole Tract, is turned outward.




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The Ninth Table

Shews the beginnings of the fifth and ſixth pair of Nerves, and the Roots of the Intercoſtal Nerve proceeding from them; moreover, the Origines and Branchings out of the ſame Intercoſtal Nerve and the wandring Pair, and of the acceſſory Nerve produced out of the Spine to the wandring Pair carried to the Region of the Ventricle. Beſides, here are repreſented the beginnings and diſtributions of the ſeventh, ninth, tenth Pair of Nerves, and of the Nerve of the Diaphragma; alſo the beginnings of the Vertebral Nerves in their whole Tract from the Region of the Nerves inſerted in the *Præcordia* and *Viſcera* are deſcribed, and their Communications with the former. All this whole following Table ſhews how it is found in Man different from other living Creatures.

A. *The Nerve of the fifth Pair with its two Branches* A. A. *the upper of which tending ſtraight forwards, diſtributes ſhoots into the muſcles of the Eyes and Face, into the Noſe, Palate, and the upper part of the whole Mouth; moreover, it reflects two ſhoots* a. a. *which are the two roots of the intercoſtal Nerve: the other lower Branch of the fifth Pair tending downwards, is diſperſed into the lower Jaw and all its parts.*

a. a. *Two ſhoots ſent down from the upper Branch of the fifth Pair, which meeting together with the other ſhoot* b. *reflected from the Nerve of the ſixth pair, conſtitute the trunk of the Intercoſtal trunk* D.

B. *The Nerve of the ſixth pair tending ſtraight forwards into the muſcles of the Eyes, out of whoſe trunk a ſhoot* b. *which is the third root of the intercoſtal Nerve, is reflected.*

b. *The third root of the intercoſtal Nerve.*

C. *The Original of the hearing Nerves or of the ſeventh pair with its double Proceſs,* viz. *ſoft and hard.*

c. *The ſofter Branch of it which is wholly diſtributed into the inward part of the Ear,* viz. *into the muſcle lifting up the hammer, and into the ſhell.*

c. *The harder Branch of it, which ariſing whole without the Skull, and being inoculated with the ſhoot of the eighth pair* e. *conſtitutes with it a ſingle Nerve, which preſently is divided into many ſhoots: of which*

1. *is beſtowed on the muſcles of the tongue and of the bone* Hyoides.
2. *Again into more ſhoots, the upper of which*
3. *Into the muſcles of the Face and Mouth.*
4. *Into the muſcles of the Eye-lids and Forehead.*
5. *Into the muſcles of the Ear.*

D. *The trunk of the intercoſtal Nerve conſiſting of the three aforeſaid Roots about to paſs into the Ganglioform infolding: which infolding of the intercoſtal Nerve, brought without the Skull, ſeems to be the higheſt knot.*

E. *The Original of the Nerve of the wandring or eighth pair conſiſting of many Fibres, with which the Nerve* ♀. *ariſing out of the Spine, joyns, and being inoculated with them, paſſes together through the Skull, which being paſſed, it departs again, and having made a communication with ſome neighbouring Nerves, is beſtowed on the muſcles of the Shoulders and Back.*

e. *A ſhoot of the eighth Pair meeting with the auditory Nerve.*

f. f. f. *Other ſhoots of the wandring Pair going into the muſcles of the Neck.*

G. *The principal Branch of the ſame Pair being loſt or drowned in the Ganglioform infolding being near.*

H. *The upper Ganglioform infolding of the wandring Pair which admits a ſhoot* k. *out of another near infolding of the intercoſtal Nerve.*

h. *A Branch out of the aforeſaid infolding of the wandring Pair going into the muſcles of the* Larynx, *a noted ſhoot of which entring into the Shield-like Cartilage, meets with the returning Nerve, and is united to the ſame.*

i. *A ſhoot ſent from the cervical Infolding of the intercoſtal Nerve into the trunk of the wandring Pair.*

K. *The lower infolding of the wandring Pair from which many Nerves proceed for the Heart and its Appendix.*

l. *A noted ſhoot ſent to the Cardiack infolding.*

m. *Nervous Fibres diſtributed into the* Pericardium *and the Veſſels hanging to the Heart.*

n. *The left returning Nerve, which being reflected from compaſſing about the deſcending trunk of the* Aorta *upwards towards the Scutiform Cartilage, imparts in its aſcent many ſhoots **** to the rough Artery, and at length meets with a ſhoot* h. *ſent from the Ganglioform infolding. This returning back from the knot of reflection, ſends ſome ſhoots towards the Heart.*

L. *The returning Nerve in the right ſide, which being reflected much higher, binds about the axillary Artery.*

O. *A noted branch ſent down from the trunk of the wandring pair in the left ſide towards the Heart, one ſhoot of which preſently becoming forked, compaſſes about the trunk of the Pneumonick Vein; the other attaining the hinder region of the Heart, is diſperſed into many ſhoots which cover over its ſuperficies: a like Cardiack branch ſent out of the trunk of the other ſide, meets with this.*

p. *The ſhoot of the aforeſaid branch going about the Pneumonick Vein.*

q. *Another branch of the ſame imparting to the Heart many ſhoots which cover over its hinder ſuperficies, turned back beyond their proper ſituation.*

r.r.r. *Small ſhoots ſent out of the trunk of the wandring pair which are inſerted by a long tract to the* Oeſophagus.

S.S.S. *Many ſhoots cut off, the branchings of which being diſtributed into the ſubſtance of the Lungs, variouſly ſtraiten and bind about the blood-carrying Veſſels.*

T.T.T. *The trunk of the wandring pair divided into two branches,* viz. *the exterior and the interior, either of which inclining towards the like branches on the other ſide, are united to the ſame, and after a mutual communication conſtitute the two Stomachical branches,* viz. *the upper and the lower.*

V.V. *The inward branches, which being united in* X, *conſtitute the beginning of the lower Stomachical branch.*

W.W. *The outward branches, which being united in the Figure to be added to this, make the upper Stomachical branch.*

X. *The joyning together of the inward branches.*

F. *The beginning of the Nerve of the ninth pair with many fibres, out of which being united, a trunk being made is carried towards the tongue; but in its progreſs ſends out two ſhoots.*

Θ.Θ. *The firſt ſhoot tending downward, and united to a branch of the tenth pair, is beſtowed on the* Sternothyroeidal *Muſcle.*

Θ.Θ. *The ſecond ſhoot on the muſcles of the Bone* Hyoides.

Θ. *The trunk of this Nerve paſſing into the body of the tongue.*

G. *The upper Ganglioform infolding of the intercoſtal Nerve, which is the higheſt knot of this Nerve, being come out of the Skull.*

a. *A ſhoot out of this infolding ſent into the neighbouring infolding of the wandring pair.*

b.b. *Two nervous Proceſſes by which this infolding communicates with the Nerve of the tenth pair.*

γ. *A ſhoot ſent down into the* Sphincter *of the throat.*

r. *The middle or Cervical infolding, which being proper to man, is placed nigh the middle of the neck in the trunk of the intercoſtal Nerve.*

δ. *A noted branch out of the ſecond Vertebral pair going into this infolding, whereby this communicates with the Nerve of the* Diaphragma *in its firſt root.*

ε.ε. *Two branches from the ſame infolding into the trunk of the Nerve of the* Diaphragma.

ζ.ζ. *Many nervous fibres coming from the Cervical infolding into the returning Nerve and into the Blood-carring Veſſels, and are alſo ſowed into the trunks of the* Trachea *and the* Oeſophagus.

θ. *A ſhoot from the ſame into the trunk of the wandring pair.*

χ. *Another ſignal ſhoot into the returning Nerve.*

κ.κ. *Two ſignal ſhoots ſent down towards the Heart, which another branch* λ. *follows, ariſing a little lower: theſe being carried downwards between the* Aorta *and the Pneumonick Artery, meeting with the like branches of the other ſide, conſtitute the Cardiack infolding* Δ. *out of which the chief Nerves proceed which are beſtowed on the Heart.*

λ. *A branch proceeding a little lower from the intercoſtal trunk, which is deſtinated with the former to the Cardiack infolding.*

Δ. *The aforeſaid Cardiack infolding.*

μ. *The handle going from the ſame, which binds about the Pneumonick Artery.*

ν. *The lower handle binding the pneumonick Vein.*

Ξ. *The intercoſtal Nerve demerſed into the cavity of the* Thorax, *where it binds the axillary Artery.*

ξ.ξ.ξ.ξ. *The four Vertebral Nerves ſent down into the infolding of the* Thorax, *the upper of which binds the Vertebral Artery.*

ο.ο.ο. *Three noted branches ſent down from the Cardiack infolding, which cover the anterior region of the Heart, as the Nerves* p. q. *going from the trunk of the wandring pair, impart branchings to its hinder part.*

π. *The Vertebral Artery bound about by the Vertebral Nerve.*

ϛ.ϛ.ϛ. *Nervous ſhoots covering the anterior region of the Heart.*

τ.τ.τ. *Shoots and nervous Fibres diſtributed to its hinder part.*

Θ. *The lower Infolding, called properly the Intercoſtal or Thoracical, into which, beſides the intercoſtal Nerve, four Vertebrals are inſerted: the uppermoſt of theſe in its deſcent binds about the Vertebral Artery.*

I. *The intercoſtal Nerve deſcending nigh the roots of the ſides through the cavity of the* Thorax, *where in its whole progreſs it admits a branch from between the ſeveral knots of the* Vertebræ.

H. *The Nerve of the tenth pair, conſiſting of many fibres in the beginning, ariſes between the firſt and ſecond* Vertebræ, *where preſently it ſends forth two nervous proceſſes* b. b. *into the upper infolding of the intercoſtal Nerve.*

* *A branch of it, which being united to a ſhoot of the ninth pair, is beſtowed into the* Sternothyroeidal *Muſcle immediately lying on the rough Artery.*

□. *A ſhoot reflected into the poſterior muſcles of the Neck.*

△. *A ſhoot into the pathetick Spinal Nerve.*

◆ ◆ ◆ *Shoots from the chief branch of the ſame Nerve into the* Sternothyroeidal *Muſcle.*

L. *The original of the chief Vertebral Nerve, which in this, as in all other Vertebrals, conſiſts of many Fibres, one band of which going out of the lower margine of the Spinal Marrow, and another from the upper, meeting, go together into one trunk, which is preſently divided into nerves diſtributed many ways.*

ϱ. *A ſhoot from this Nerve into the branch of the tenth pair.*

e. *Another ſhoot into the Spinal Pathetick.*

c. *A noted ſhoot ſent forth upwards into the muſcles of the Neck and Ears.*

T. *A ſhoot from the crooked Nerve into the muſcles of the Neck.*

7. *A Nerve from this pair into the firſt brachial nerve, out of which the nerve of the Diaphragma hath its higheſt root.*

M. *The beginning of the ſecond Vertebral, out of which the upper Brachial branch proceeds, and in which the nerve of the Diaphragma is firſt rooted. This Brachial nerve in four-footed Beaſts ariſes near the fourth or fifth* Vertebræ, *and ſo the root of the Diaphragma is placed lower.*

ν. *The Vertebral branch deſtinated to the Arm.*

ϒ. *The Nerve of the Diaphragma, a ſhoot of whoſe root* ♂. *comes to the Cervical infolding, and a little lower two other branches from the ſame infolding* ϱ.ϱ. *are reached out into its trunk. This communication is proper to man.*

φ. *The other root of the Diaphragma from the ſecond and third Brachial nerve.*

χ. *The lower trunk of the nerve of the Diaphragma being removed out of its place, which in its proper ſituation, paſſing through the cavity of the* Thorax *without any communication, goes ſtraight forward to the Diaphragma, where being ſtretched out into three ſhoots, it is inſerted into its muſculous part.*

ϯ.ϯ.ϯ.ϯ. *The other Brachial nerves, out of whoſe roots nerves go into the intercoſtal Infolding.*

ω.ω.ω.ω. *The beginnings of the Vertebral nerves, from the ſeveral roots of which a branch is carried into the intercoſtal nerve.*

♆.♆ *The laſt beginning of the Spinal acceſſory Nerve, going to the wandring pair, beginning with a ſharp point.*

♀. *The trunk of the ſame Nerve aſcending, which in its whole aſcent, going through the ſide of the Spinal Marrow, paſſes through the midſt of the beginnings of the Vertebral nerves, and receives Fibres from the ſtock of the Marrow.*

♂. *The trunk of the ſame Nerve deſcending, which departing from the wandring pair, is reflected outwards, and after having had communications with the nerves of the ninth and tenth pairs, it is beſtowed wholly on the muſcles of the Shoulder.*

☽. *The lower proceſs of the ſame Nerve.*

The Tenth Table

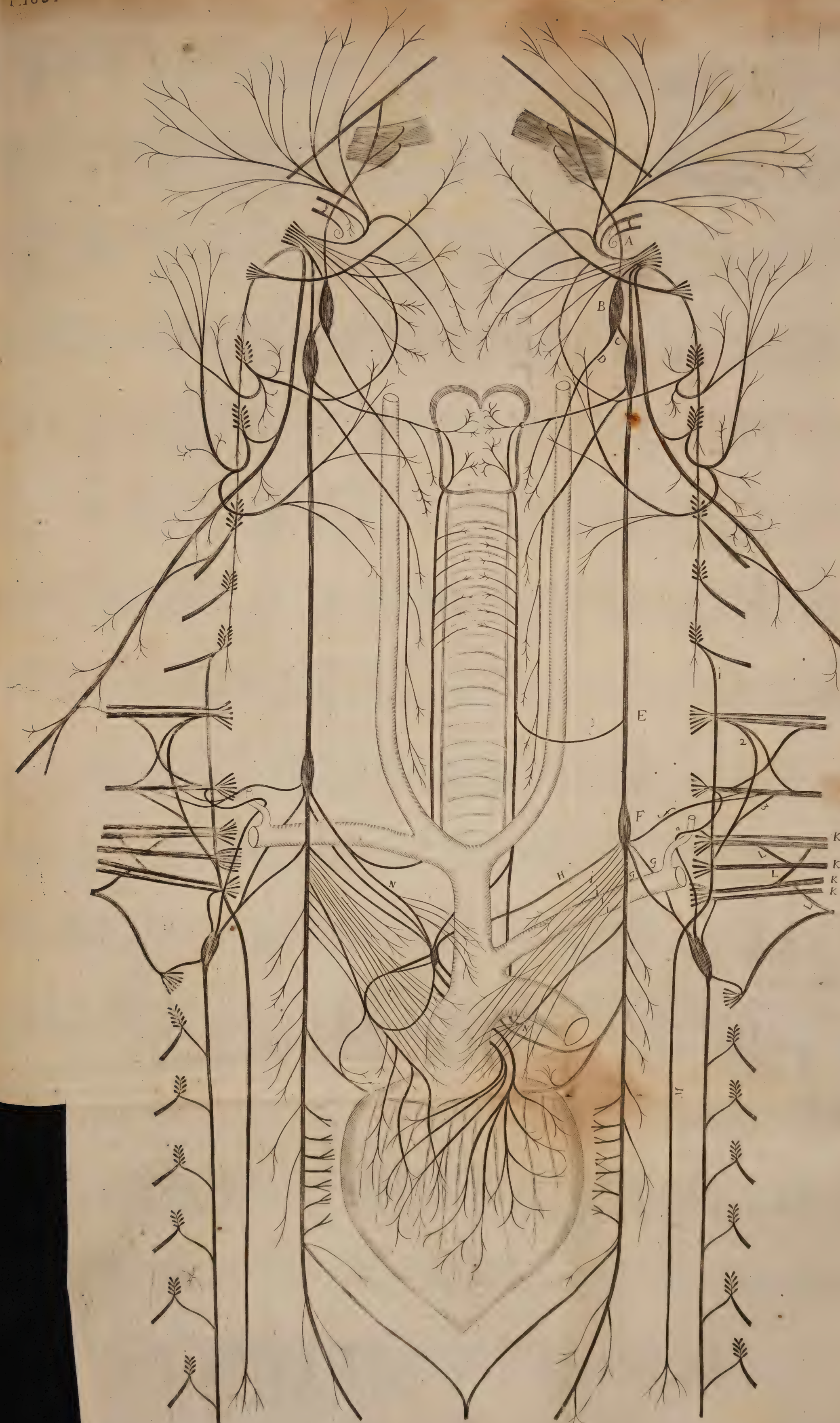
Shews the beginnings and Branchings out of the ſame Nerves which were deſcribed in the former Table, as ſome of them are found in brute Beaſts otherwiſe than in Man.

A. *The trunk of the intercoſtal Nerve going out of the Skull.*
B. *The upper Ganglioform infolding ſpringing out of the trunk of the intercoſtal nerve.*
C. *The intercoſtal nerve ariſing out of the aforeſaid proper infolding, and ſent down into the other neighbouring infolding of the wandring pair.*
D. *A ſhoot from the upper infolding into the Sphincter of the throat.*
E. *Both the Nerves included in the ſame ſheath, as if they were the ſame trunk, deſcend towards the* Thorax: *out of which trunk appearing in this place, a branch is ſent out into the returning nerve.*
F. *The lower infolding in the trunk of the wandring pair, or rather conſiſting in the common ſheath of either nerve.*
f. *A ſhoot out of this infolding into the Brachial branch coming between, in which branch the nerve of the Diaphragma hath its root.*
G. *The intercoſtal Nerve departing from the ſame infolding, and going under the axillar Artery, is inſerted into the infolding of the* Thorax.
g. *Another Branch going between the two infoldings, and going above the axillary Artery, ſo that theſe two nerves having made an handle, bind about the Artery.*
H. *A noted ſhoot out of the aforeſaid infolding of the wandring pair into the Cardiack infolding.*
i.i.i.i. *From thence many nervous Fibres are ſent down into the Veſſels belonging to the Heart, and into the Pericardium.*
k.k.k.k. *The greater Brachial nerves which are produced a little lower in Brute animals, than in Man: and therefore the nerve of the Diaphragma ariſes lower.*
L.L.L. *The Brachial nerves mutually cutting one another by the croſs proceſſes, communicate among themſelves.*
M. *The Nerve of the Diaphragma conſiſting of three roots, when in Man they are only two.*
1. *The firſt root of the ſame Nerve.*
2. *Its ſecond Root.*
3. *Its third Root, which communicates mediately with the infolding of the wandring pair,* viz. *by the trunk of the Brachial branch, to which it is fixed.*
n. *A Nerve carried from the ſecond Brachial branch into the intercoſtal infolding, which binds about in its paſſage the Vertebral Artery.*
N. *Shoots and ſuckers ſent down from both knots of the returning nerve towards the Heart and its Appendix.*

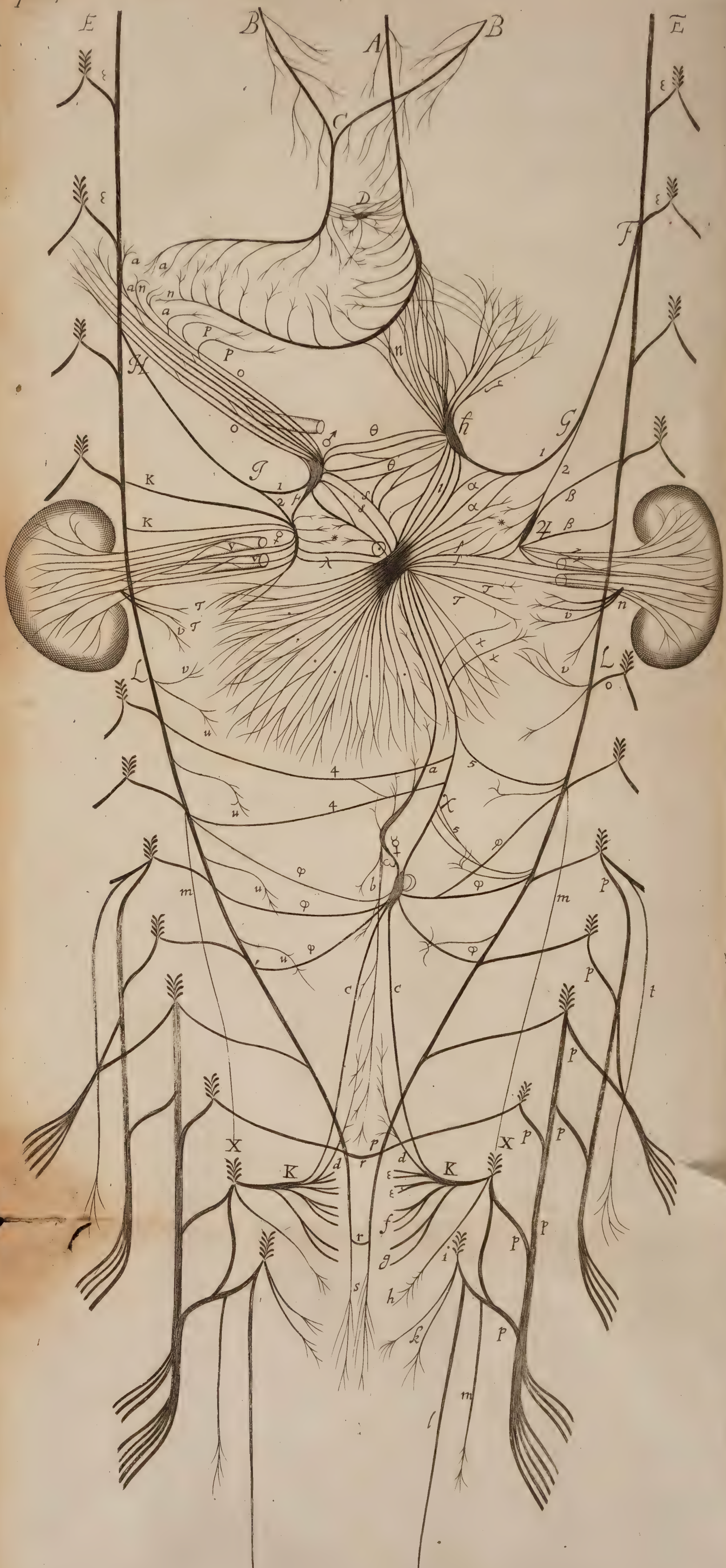
The other Nerves and their Branchings out are as in the other Figure, which ſhews the pattern of them in Man.

The

Tabula x^ma



p. 187.



The Eleventh Table

Shews the lower Branchings out of the wandring and the Intercoſtal Pair diſtributed to the Ventricle and the *Viſcera* of the Abdomen; alſo the beginnings of the Vertebral Nerves, which are placed over againſt the former, and are ingraffed into ſome of them. The Figure of theſe in Man and in four-footed Beaſts is almoſt alike, ſo that this Table may be common for both.

A. *The lower Stomachical Branch which is made up out of the internal branches of each wandring pair, being united together, and covering the bottom of the Ventricle, diſperſes ſhoots on every ſide in the whole tract.*

B. *The upper Stomachical Branch which is made out of the external branches of the wandring pair, on either ſide united together, and creeps through the top of the Ventricle.*

C. *The Coalition or joyning together of the Branches.*

D. *The nervous Infolding out of the Fibres of both the Stomachical nerves, being united together nigh the Orifice, and as it were woven into a Net.*

a.a. *The ends of both the Stomachical nerves which there meet with the nerves of the Liver, and communicate with them.*

E.E. *The Intercoſtal nerve deſcending on either ſide nigh the roots of the Ribs, and in its whole deſcent receiving a branch from the ſeveral Vertebral nerves ε.ε.*

F. *A branch going out of the Nerve of the left intercoſtal ſide, and ſent down towards the Meſenterick infoldings.*

G. *The ſame Meſenterick nerve becoming forked, ſends out the greater branch into the infolding, which is the Stomachical and Splenetick, and the leſſer into that belonging to the Reins.*

H. *The like Meſenterick branch going out of the intercoſtal nerve on the right ſide, and inclining towards the Meſenterick infolding.*

I. *The greater Branch of this nerve becoming in like manner twofold, the greater branch going into the Hepatick, and the leſſer into the Renal infolding, or that belonging to the Kidneys.*

♄. *The chief Meſenterick Infolding of the left ſide, which is alſo the Stomachical and Lienary, or belonging to the Spleen; out of which many little bundles of Nerves or numerous Conjugations are ſent out many ways.*

♃. *The Renal Meſenterick Infolding of the left ſide, into which, beſides the Meſenterick ſhoot,*

β.β. *two other Nerves are carried immediately out of the Intercoſtal nerve.*

γ.γ.γ. *From this Infolding, planted near the Bilary Cheſt, many Nerves and Fibres are ſent into the Kidney.*

δ.δ. *Nerves and Fibres by which this infolding communicates with the greateſt infolding of the Meſentery.*

ζ. *The chief bundle of Nerves tending out of the former infolding ♄. into the Spleen, which it having reached, reflects from thence certain Fibres into the bottom of the Ventricle.*

η. *The ſecond Conjugation of the Nerves from the aforeſaid infolding into the bottom of the Belly, whoſe Fibres communicate with the ſhoots and fibres of the lower Stomachical nerve.*

θ. *The third Conjugation of Nerves between this infolding and the neighbouring Hepatick ♂.*

ι. *The fourth Conjugation of the Nerves between this and the greateſt infolding of the Meſentery ☉.*

♀. *The Renal Meſenterick Infolding of the right ſide, into which (as in its fellow) beſides the Meſenterick branch,*

K.K. *two nerves are produced from the intercoſtal nerve.*

λ. *The Nerves and Fibres between this infolding and the greateſt of the Meſentery.*

μ. *A noted Branch between this infolding and the neighbouring Hepatick.*

ν. *A noted Company of Nerves and Fibres from this infolding into the Kidney, which climb over the emulgent Veſſels, and variouſly bind them about.*

♂. *The ſuperior Meſenterick Infolding of the right ſide.*

ο. *A great Conjugation of Nerves out of this Infolding into the Liver and Gall-Cheſt,*

out

out of which also many shoots are distributed into the Pylorus and Pancreas. The Nerves and Fibres of this, in its ascent towards the Liver, cover the Hepatick Artery, by making as it were a little Net, and almost hide its trunk. The shoots of these meet with the tops of the Stomachical nerve α.α.

π.π. *Shoots distributed about the Pylorus.*

p p. *Other shoots dispersed into the Pancreas.*

ς.ς. *Nerves reaching out between this Infolding and the greatest of the Mesentery. This infolding communicates with the neighbouring Renal by* μ. *and with the Stomachical by* θ.

⊙. *The greatest Mesenterick infolding out of which a mighty bundle of Nerves ..... arising under the great Glandula of the Mesentery, from thence is dispersed on every side about into many shoots and branches, and they are distributed into all the Intestines, except the straight Intestine. The Nerves and Fibres reaching out on every side, are knit to the Mesenterick Arteries and Veins in its whole compass, and variously strain and bind them about.*

τ.τ. *Nervous shoots from this Infolding into the Womens testicles, or the uterine Glandula's, which meet with the branches of the Vertebral nerves of the twentieth and one and twentieth pair sent into the same parts, and are inoculated with them.*

v v. *The Vertebral branches into the Womens testicles.*

☽. *The lowest Infolding of the Mesentery placed much below the former, and having for its beginning three nerves on either side arising lower from the Intercostals.*

φ.φ.φ. *Three Nerves on either side sent down from the intercostal nerve into the lowest infolding of the Mesentery.*

χ.χ. *A Nerve stretching out of that Infolding directly into the greatest infolding of the Mesentery, which in its passage receives on both sides some shoots from the intercostal nerve,* viz. 4. 4. 5. 5. 5. *and it self sends two shoots into the Womens testicles.*

ϟ.ϟ. *Two branches from the aforesaid Nerve into the Womens testicles.*

☿. *Another small Infolding standing a little above this lowest.*

ϖ. *A nervous Process reaching out of the aforesaid lowest Infolding into the neighbouring very little infolding.*

a. *From the least Infolding* ☿. *a noted nerve being carried into the greatest infolding of the Mesentery, which in its whole ascent stretches under the straight Intestine and part of the Colon, and inserts frequent shoots into them.*

b. *Another Branch sent from the same Infolding downward, which stretches under the lower part of the same straight Intestine, and imparts to it frequent shoots.*

C.C. *Two Nerves sent downward from the lowest infolding of the Mesentery* ☽, *which being sent down into the Bason about the lowest cavity of the Belly, enter the two infoldings there* K.K. viz. *one placed in either side.*

K K. *A double Infolding placed within the Bason, whose nerves provide for the several excretions there made,* viz. *of the Urine, Dung, and Seed; these send out nerves* d.d. *towards the lowest Mesenterick infolding.*

d.d. *A nerve ascending from the aforesaid Infolding on either side, nigh the sides of the straight Intestine, inserts shoots into it; which double infolding, another nerve descending* (b) *from the least infolding, meets with.*

ε.ε. *Two Nerves from the same Infolding into the Womb.*

f. *A nerve from the same Infolding into the Bladder.*

g. *A nerve into the Glandules* Prostatæ.

h. *A nerve out of the Root of the eighth and twentieth Vertebral pair into the muscles of the* Anus.

i. *The nine and twentieth Vertebral pair, from which*

k. *goes a Nerve into the Sphincter, and the other muscles of the* Anus.

l. *A noted nerve on both sides from that pair into the Yard.*

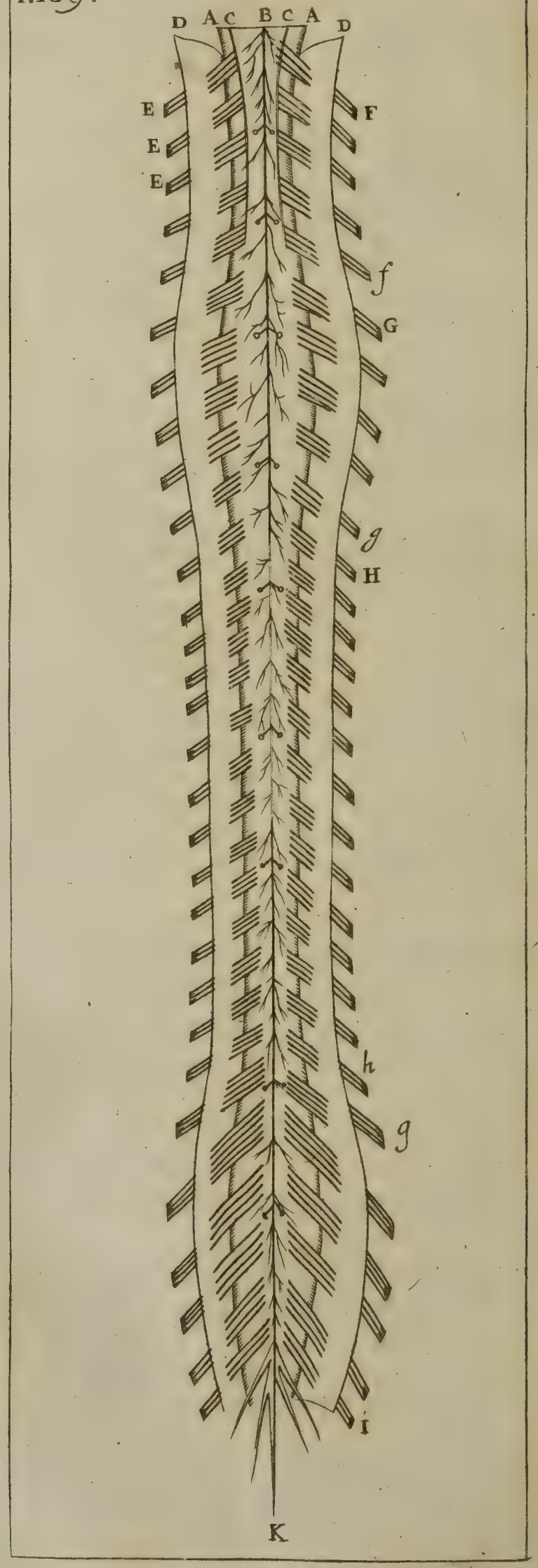
m. *Another shorter Branch into the muscles of the Yard.*

L.L. *The intercostal nerve below the Reins.*

m. *A little nerve from the Vertebral branch into the Cremasteral muscle of a Mans Testicles.*

n. *The one and twentieth Vertebral pair; the beginning of which being placed behind the Kidneys, lyes hid. From this Nerve very many shoots are sent out on both sides into the testicles of the female Sex, which meet with other Mesenterick shoots, distributed to the same part.*

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o. *A Nerve from the two and twentieth Vertebral pair, out of which alſo are ſome ſhoots ſent into the Womans teſticles.*

p.p.p.p.p.p.p.p.p.p. *Nerves deſtinated for the thigh, of which thoſe that ariſe higher, receive in their deſcent branches from the nerves ariſing lower.*

q. *The intercoſtal Nerves inclining mutually one to the other, near the beginning of the* Os Sacrum, *communicate by the croſs Proceſs* ⊣.

r. *Another croſs Proceſs within the crookedneſs of the* Os Sacrum *knitting together the two intercoſtal nerves.*

s. *Both the intercoſtal Nerves ending in moſt ſmall fibres, which fibres are diſtributed into the very Sphincter of the* Anus.

t. *A Nerve from the twenty fourth Vertebral pair, which is carried into the inguinal Glandula's or of the Groyn.*

v.v.v.&c. *Shoots ſent down from the intercoſtal Nerve on both ſides into the body of the Ureters.*

x. *A Nerve which is deſtinated to the Teſticles and the Cremaſteral Muſcle, cut off where it goes out of the Abdomen.*

The Twelfth Table

Shews the Spinal Marrow whole taken out of its bony Den, and half taken from the Membrane cloathing it, being diſſected, that the beginnings and productions of all the Vertebral Nerves might be ſeen together.

A.A. *The top of the Spinal Marrow, where it is cut off from its cleaving to the oblong Marrow.*

B. *The Spinal Artery ſeen to deſcend through the whole Marrow, which however is made up of Arteries, brought into it from between the ſeveral joyntings of the* Vertebræ.

C.C. *The Spinal Nerve coming from the fifth or ſixth* Vertebra *of the Neck to the beginning of the wandring pair.*

D.D. *Portions of the Membrane cloathing the Marrow diſſected and rolled off.*

E.E.E. *The Spinal Nerves ſent out of the upper margine of the Marrow by bands, with which the like bundles alſo being carried from the lower margine, meet and joyn together all into one trunk within the junctures of the* Vertebræ: *then being ſeparated again without them, they are carried into their reſpective Provinces.*

F.f. *Nerves brought forth within the region of the Neck.*

G.g. *Nerves deſtinated for the Shoulder and Arm, where both the Marrow is larger, and the bundles of the nerves are greater.*

H.h. *Nerves going out about the Back and Loyns: where both the body of the Marrow is again ſmaller, and the little bundles of the nerves are a little ſlenderer.*

I.i. *Nerves deſtinated for the thighs, where alſo the medullar body and the little bundles of the nerves are again larger.*

K. *Nerves going out of the* Os Sacrum.

The Thirteenth Table.

FIGURE I.

Shews the branchings forth of the Vertebral Artery reaching out on both ſides into the ſuperiour part of the Spinal Marrow, and into the hinder Region of the oblong Marrow.

A.A. *The Region of the poſterior oblong Marrow.*
B. *The common paſſage made from both the Vertebral Arteries united together.*
C. *The Rhomboidal Figure, which in Brutes a double coalition of the Vertebral Arteries deſcribes.*
D. *The firſt joyning together of the Vertebral Arteries above the Spinal Marrow, from which place the Spinal Artery deſcends.*
E. *The Spinal Artery.*
F.F. *Two Vertebral Arteries carried from the axillary branches.*
G. *The Spinal Marrow.*
f.f.f.f.&c. *Arterious ſhoots into the muſcles of the Neck.*
g g g.g. *Shoots ſent in the Spinal Marrow which joyn together from either ſide in the Spinal Marrow nigh the ſeveral joynings of the* Vertebræ.
h.h.h.h. *Arterious ſhoots, which following the chanels of the Boſoms, make the arterious Infolding, as it is deſcribed in the third Figure.*
f.f. *Two Arteries ſent down from the* Aorta *into the Spine.*

FIGURE II.

Shews the Vertebral Veins which are Companions to the aboveſaid Arteries; alſo the upper portion of the Vertebral Boſom and the communications of either among themſelves and lateral Boſoms of the Head, and between the Jugular Veins.

A. *The third Boſom of the Head cut off, where it paſſes into its lateral Boſoms.*
B.B. *The lateral Boſoms of the Head.*
C.C. *The round Den where the lateral Boſom goes on both ſides into the Jugular Vein.*
D.D. *The Jugular Vein.*
E. *The upper joynting of the Vertebral Boſoms.*
F.F. *The Vertebral Boſom on either ſide within the Skull brought through, and there paſſing into the lateral Boſom.*
G.G. *The trunk of either Vertebral Vein brought from the* Vena Cava, *and there beginning.*
H.H. *Either trunk of the Vertebral Boſom there cut off, which lower is continued through the whole paſſage of the Spine.*
h.h.h.h.h.h. *The joynings together on both ſides within the Commiſſures of the* Vertebræ *between the Vertebral Vein and Vertebral Boſom.*
i.i.i.i. *The Veinous paſſages, which reaching out before without the* Vertebræ, *are carried from the Vein of one ſide to its fellow of the other ſide.*
I.I. *The communication of all the Boſoms and Veins in the top of the Spine.*
k.k. *The Veinous paſſage from the concourſe of the Boſoms and Veins on both ſides into the Jugular Vein.*
l.l.l.l.&c. *The joynings together of the Boſoms of either ſide near the* Internodia *of the* Vertebræ.
m.m.m m.&c. *The paſſages of the Veins carrying back the Blood from the Spinal Marrow into the Boſoms.*
n.n.n.n.&c. *The Chanels of the Veins carrying back the Blood from the muſcles of the Neck*

fig. 3tia.

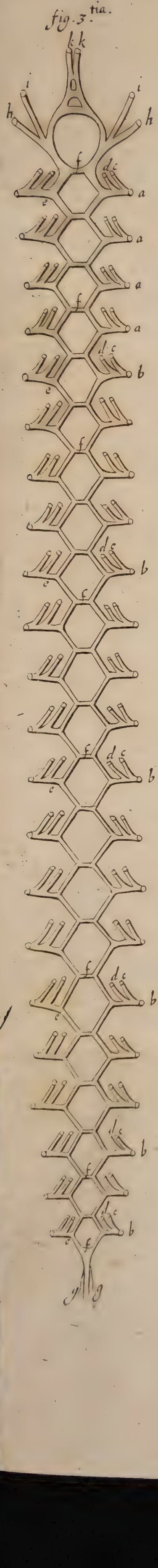


fig. 1ma

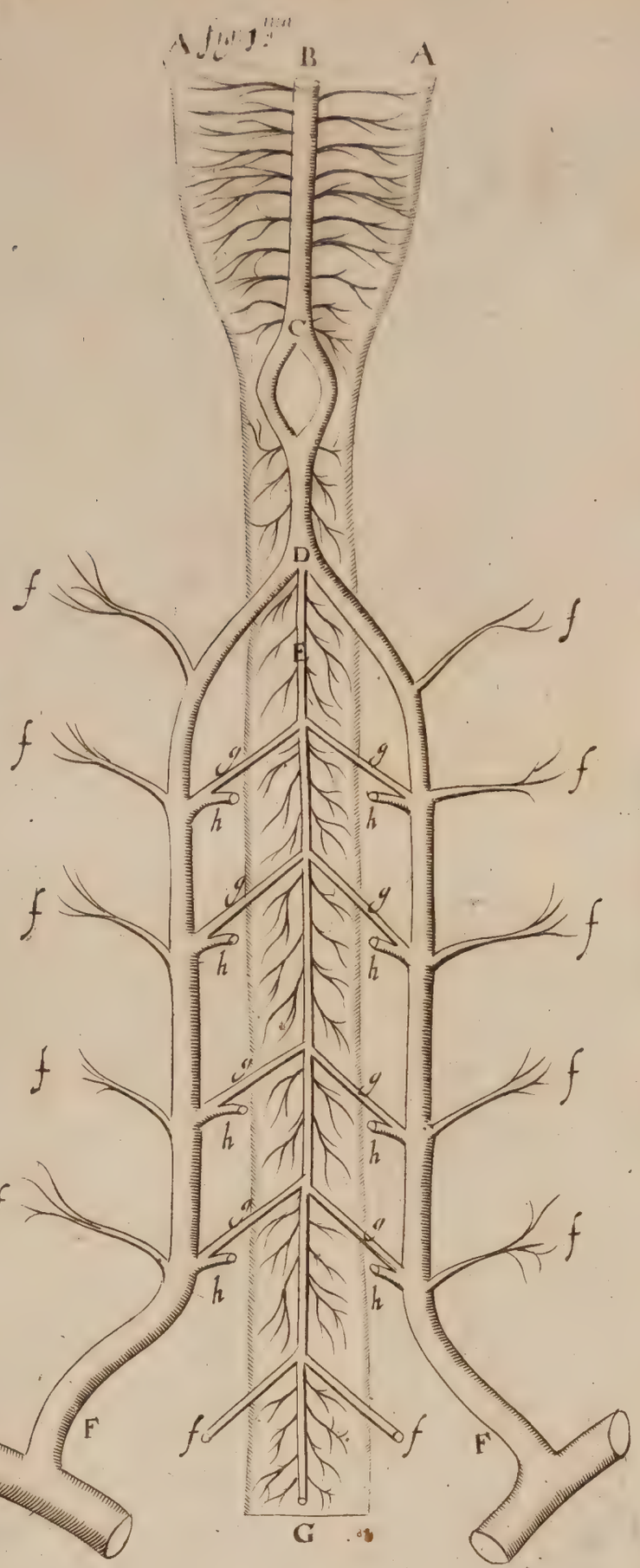


fig. 4ta

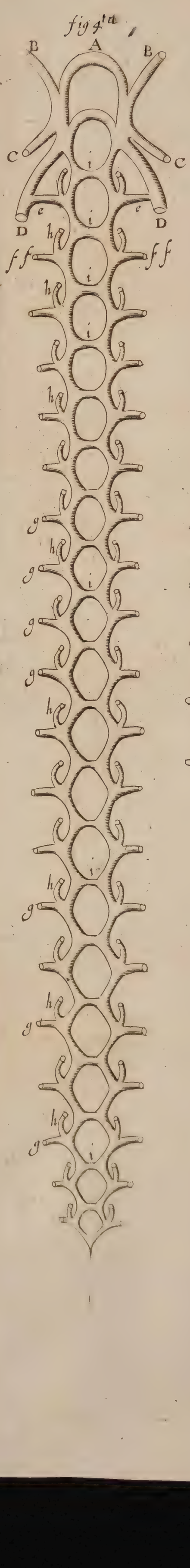


fig. 5ta.

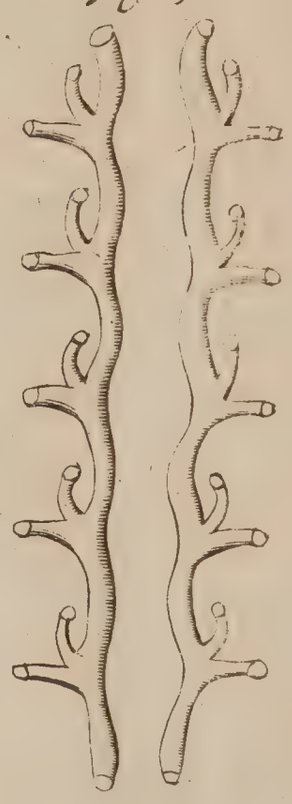


fig. 2da.

FIGURE III.

Shews the Spinal Artery which is produced within the bony Den nigh the more inward Superficies of the Marrow, from the hinder part of the Head to the *Os Sacrum*, in the shape of a Net-work purl.

a.a.a.a. *Arterious shoots sent towards the Spine from the Vertebral Artery ascending between the holes of the Spinal Processes.*
b.b.b.b.&c. *Arterious shoots sent from the* Aorta *towards the Spine.*
c.c.c.c.&c. *An arterious shoot reaching out of every of the aforesaid shoots into the posterior Marrow.*
d.d.d.d.&c. *Another shoot reaching out of every of the aforesaid shoots into the anterior Marrow.*
e.e.e.e.&c. *Every the aforesaid arterious shoots, as soon as carried into the bony den becoming forked, send forth a little branch into either part, which on both sides communicates with the next branch of the same side, and by the cross Process with the fellow-branch of the other side.*
f.f.f.f. *The joynings together of the Arteries of either side by the cross shoot.*
g.g. *The arterious shoots going out of the* Os Sacrum.
h.h. *Arterious shoots into the* Meningæ *of the hinder part of the Head.*
i.i. *Arterious shoots going out of the Skull with the Nerves of the seventh pair.*
k.k. *Shoots reaching out into the wonderful Net, which in their progress are ingraffed mutually among themselves, and also with the Arteries Carotides.*

FIGURE IV.

Shews the Branchings out of the Spinal Bosom in its whole passage.

A. *The uppermost joyning of the Bosoms of either side.*
B.B. *Chanels reaching out of either Vertebral Bosom into the lateral Bosoms of the Head.*
C.C. *Chanels brought from the common concourse of the Bosoms, and the Vertebral Veins into the Jugular Veins.*
D.D. *The Vertebral Veins.*
e.e. *A communication between the Spinal Bosom and the Vertebral Vein.*
f.f.f.f. *The passages of the Veins from either Bosom into the trunk of the Vertebral Vein.*
g.g.g.g.&c. *The like Venous passages which are continued lower into the branches of the Vein* Azygos, *and lastly into the lumbary shoots of the* Vena Cava.
h.h.h.h.&c. *The Pipes of the Veins, which receiving the blood from the Spinal Marrow carry it back into the Bosoms.*
i.i.i.i.&c. *The Commissures or joynings of the Bosoms of either side nigh the several joyntings of the* Vertebræ.

FIGURE V.

Shews the Image of the Spinal Bosom in a Dog, which hath not joynings together in its whole passage, as it is in a Calf, Sheep, Hog, and many others, but only in the lowest and uppermost part, where it communicates with it self by three or four cross Processes.

THE CONCLUSION.

THUS much for the Anatomy of the Brain and Cerebel, and of their Appendix, both Medullar and Nervous, and of the Uſes and Offices of all the ſeveral Parts, of which we have largely treated. There yet remains, after we have viewed, not only the outward Courts and Porches of this Fabrick, as it were of a certain Kingly Palace, but alſo its intimate Receſſes and private Chambers, that we next inquire into, what the Lady or Inhabitant of this Princely place may be, in what part ſhe doth chiefly reſide, and by what Rule and Government ſhe diſpoſes and orders her Family. Then we ought to take notice, what defects and irregularities happen to it, or to its parts and powers; then to what injuries of changes or Diſeaſes this Building or Houſe, to wit, the Brain and nervous Stock, may be obnoxious. For indeed I am as it were bound, by reaſon of the Work it ſelf, and the promiſe I made before, that for the Crown of the Work, a certain Theory of the Soul of Brutes ſhould be added after the naked Anatomical Obſervations and Hiſtories of Living Creatures, and of their animated Parts. Truly it is but juſt and equal, that we enter upon this Diſcourſe of the Soul, and that other task of *Pathologie*, to wit, that the Aſperities and hard ſence of our already inſtituted *Anatomy* may be ſweetned with thoſe kind of more pleaſant Speculations, as it were cloathing the Skeleton with fleſh; and that the Reader being wearied by a long and troubleſom Journey, may be a little refreſhed and recreated. For in truth, whatſoever of our Work is performed without form or beauty, may ſeem as the Foundation of a Building only placed on the ground, in which no elegancy or neatneſs doth yet ſhine, but that all things appear rude, and as yet built of rough and unpoliſhed ſtones. A Superſtructure indeed may be promiſed to be put upon this Foundation, perhaps fair and beautiful, whereby the minds of the Beholders may be pleaſed and inſtructed. But truly this kind of work may be too hard and great to be performed by our weakneſs: neither doth it become me to proceed in my undertakings, before theſe have undergone the Cenſure and chance to which they are ſubject. For I fear, leſt this Foundation, but now laid, ſhould become too weak and feeble for the ſuſtaining an higher Fabrick, at leaſt until this hath for ſome time undergone the tryal, by lying open to winds and ſtorms.

FINIS.

AN

ESSAY

OF THE

PATHOLOGY

OF THE

BRAIN

AND

Nervous Stock:

In Which

Convulsive Diseases

Are Treated of:

Being the Work of *THOMAS WILLIS*
of *Christ-Church* in *Oxford*, Doctor in Physick, and
Sidly-Professor of Natural Philosophy in that
Famous Academy.

Translated out of *Latine* into *English*, By *S.P.*

LONDON,

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at *Chancery-Lane-End* in *Fleet-street*. 1681.

The Authours Epiſtle Dedicatory.

To the Moſt Reverend Father in Chriſt, His Grace, Gilbert, *by Divine Providence, Archbiſhop of* Canterbury, *Primate and Metropolitan of all* England, *and One of His Sacred Majeſties moſt Honourable Privy Council.*

IT is ſo Ordained by the Laws, moſt Noble Prelate, that whatſoever ſhall happen to be built upon any ones ground, it ſhall be his own, by right of acceſſion. Since therefore, to that work which I lately attempted, concerning the gifts and Nature of the Senſitive Soul, as alſo the Affections of the Brain, and nervous ſtock, and the various Diſeaſes which belong to them, I had placed the Anatomy of the humane Head for a foundation; it was altogether neceſſary (this Treatiſe being Dedicated to your Grace) that whatſoever building ſhould be raiſed on that Foundation, ſhould truly, and rightly be ſaid to be yours: And ſo indeed, we continue the fault, we had ſometimes Committed, and it becomes not only a ſtep, but what is more, an obligation to the following Crime; that at length, we ſeem rather to perform a Duty, the name of a fault being loſt, than to become Criminal.

But in the mean time, this matter in which I buſie my ſelf, may not be ſaid to be unfit for your Knowledge, or to be diſagreeing to the buſineſs of the Church, over which you moſt happily preſide; For both thoſe Epilepticks which are to be met with here precipitating themſelves into the water or the fire, and thoſe whoſe members variouſly Contracted and diſtorted with Spaſms or Convulſions, and thoſe whoſe whole Bodies ſo bent, that they could not ſtand upright, by and by, as if by Inſpiration of the Devill, they are agitated with Stupendious leapings, and other wonderfull geſticulations. Theſe I ſay, and many other Sick men whom I here every where deſcribe, ſeem not much to differ from thoſe whom we read of in the Evangeliſts, to be cured by our Lord Jeſus Chriſt; and although ſuch be to be cured however Contumatious and rebellious they are, the Phyſitian, however Skillfull he be, ought allways to Implore the help of the Heavenly Power, to be aſſiſting to him, being above all the

Strength

Strength of Medicines. Therefore and by right the Diſeaſe by the Ancients called Holy of the word *Theoria*, and the reſt of our Pathology, as if it contained in it a certain Divinity, explicates the Diſeaſe to be cured no leſſe with prayers and faſtings than with Medicines, and therefore ſhould deſire greatly to call upon the Authority of Holy men, and to be helped by the Power of your Sanctity.

Beſides it is no new thing that there ſhould be an Entrance into the Church thorow the Spittle, for that it appears, our Saviour to have uſed almoſt this method, who would for the moſt part, that the health of the Soul, ſhould take its beginning from the reſtored health of the Body. And truly, as the Stupid *Deliriums* of Melancholicks, the Caniniſh madneſs, and others ſprung from an infirm Brain, have driven ſome, both from the Communion of Saints, and from the Society of men, if theſe had been profligated by the help of our Art, it would not be diſpair'd of, but that the men ſhould not only, growing well, have left both at once their Diſeaſes and Errors, but alſo ſhould have become Wiſe.

It remains, that I Supplicate the Great God, that he will render to his Church, the peace he has happily given to the Common-wealth, that he may take away the darkneſs from the eyes of the miſerable people, that he may withdraw the fury from their mindes, and for a pledge and advantage of ſo great a benefit, that he may long keep ſafe and in health, your Grace, the mighty Pillar, and Glory of the Reformed Religion, which is Cordially deſired by

Your Graces moſt humble

and Devoted Servant,

T. W.

Of

Of Convulsive Diseases.

CHAPTER I.

Of Spasms or Convulsive Motions in Generall.

IN handling the Convulsive Distempers, many Physitians distinguish between the *Spasme* or *Convulsion*, and *Convulsive Motion*; by the first they understand a constant Contraction, whereby the member becomes stiff and inflexible; by the Second, swift motions, and Concussions, which, coming between, cease, and return alternatly: But neither those who have observed these notes of difference, nor other Authors, have taken notice that they are continual: for that by the words *Spasme*, and *Convulsion*, they often designe a certain Spasmodick or Convulsive Affection; wherefore to distinguish it better, we will call the former distemper with *Cardan*, tetanon, a continual Convulsive Cramp, but the other *Spasm*, or, a *Convulsive motion in generall.*

But that the irregular Nature, and Causes of Convulsive motion, might more rightly have been made known, it should first have been declared, after what manner the regular motive function, is effected in an animated Body: but the more full Consideration of this, because it belongs to the Physiologie, or Reasoning of the Nature, of the Brain, and Nervous stock, it is deferred to another Discourse: For the present, we will signifie in a word, as much as shall serve for the elucidation of the matter proposed. That the animal Spirits are the next Instrument of regular motion, and that their Action, or moving force, consists only, in that they being more thickly heaped up together, in the motive part, and there spreading themselves in a more large space, they blow it up, and intumefie it, which for that reason, being contracted, as to its length, draws to it self the part hanging to it. In our description of the Nerves already published, we have shown this kind of motion to be twofold, to wit, Spontaneous, and meerly natural, the Instinct of this is derived from the Cerebel, but of that from the brain, but both through the pipes of the Nerves, as it were the channels, both to the muscles, and also to the fibres, interwoven with the membrains, and other motive parts of the *Parenchyma*, or Inwards; Lastly, in all these, the various actions are so expeditiously effected, which either natural necessity, or the rule of the will requires, by that only means, that there is an intimate Conjunction, and communication of Duty, and most swift Commerce, between the animal Spirits, which Constitute the *Hypostasis* of the sensitive Soul, within the foresaid parts, disposed, or fitted by a continued *Series*. But there is this notable difference between the motion of a muscle, and that performed by other parts; for in these, the action is most often circumscrib'd within the bounds of the motive body, so as its membranes only, or one part of the inward moves another, and consequently this is moved of its neighbour: But in the musculous stock, usually the moving part is placed in one member, and to be moved of another next it (although within some musculous part, as the Heart and *Diaphragma*, they properly for the most part move themselves only) hence the Membranes and Inwards, are said to have as it were an intestine, and vermicular Motion; such as whereever it is begun, the Spirits there more thickly gather together, and Spreading themselves forth, they first intumifie this part, then going forward another, and so farther, till at last they draw the hindermost parts, and by this means transfer an intumifaction, and therefore a motion, from one place to another; almost after the same manner as worms, and other Creeping creatures make their progression. But to this motive function of the Membranes and Inwards, if it be frequent or undiscontinued, plenty of spirits are required, which notwithstanding execute their task calmly enough, without tumult or great force: And indeed it is to be observed, that the Animal Spirits, flow not more sparingly into the Membraneous Inwards, than into the Muscles; as it appears from the

How the regular Motion is Effected.

Its beginning twofold.

The Subject also twofold.

more exquisite sense of those parts, and by the manifold insertion of Nerves within them, and the diversity of divarication, through the foldings and *fibres*, although in the mean time, the muscles are watered, with a more plentifull influx of Blood : But as to the motion, performed in the musculous stock, the heaping together, and rarefaction of the Spirits, through the whole joynting of the motive part, suddenly, and at once unfolded, are performed with such force, and strength, as the attraction of the muscle, in its motive endeavour, may exceed the force of a pully or windlace; and when this force, only depends on the expansion or rarefaction of the Spirits, seated in the motive part, we can conceive it to be no otherwise, but that the Spirits so expansed or stretched forth, as it were fired, after the manner of gunpowder, to be exploded or thrown out. But we may suppose, that to the Spirituous Saline particles, of the spirits inhabiting the interwoven *fibres* in the muscle, other nitrous-sulphureous particles, of a diverse kind, do come, and grow intimately with them, from the arterous blood, flowing every where within the same *fibres*: Then as often as the particles of either kinde, as *Nitre* and *Sulphur* combined together, by reason of the instinct of motion brought through the nerves, are moved, as an inkindling of fire, forthwith on the other side bursting forth, or being exploded, they suddenly blow up the Muscle, and from thence cause a most strong drawing together: for indeed it seems to be ordained for this end, that the Muscles are imbrewed much more plentifully with the arterous blood, than the membraneous inwards: to wit, that the Elastick coupling of the spirits, being consumed, and perpetually falling off, through the very often, and sometimes continual motion, might be by that means supplyed, from the fresh sanguineous juice: in the mean time, that the spirits themselves, being supplyed in a smaller quantity, through the small nerves, might even like old Soldiers continue longer in the same station, and follow their manifold coupling or labour. How else are labouring beasts supplyed with a sufficient stock of spirits, for so much labour, whilst they exercise allmost all their muscles, by a swift course for many howers, yea sometimes a whole day: or who can believe that a little handfull of spirits brought through the small branches of the wandring and Intercostal pairs of the Nerves to the heart, can be able by their own strength to effect that its so strong and indiscontinued motion? Indeed it seems, that of necessity there must come to them from the blood perpetually, auxilarie aid, and those afterwards to be allways exploded. For this reason certainly, the motive virtue, both of the Heart, and the rest of the Muscles, becomes more strong and Elastick, above any mechanick Organ: to wit, for as much, as the animal spirits, acting every where in the musculous stock, get to themselves an explosive *Copula*.

The Motion of a Muscle is a certain explosion of the Spirits.

If any one shall be displeased at the word *Explosion*, not yet used in Philosophy or Medicine, so that this Spasmodick Pathologie, standing on this *basis*, may seem only *ignoti per ignotius explicatio*, an explication of unknown things by more unknown things; it will be easy to shew the effect of this kinde of notion, and very many examples, and instances both concerning natural and artificiall things; from the Analogie of whose motions, in an animated body, both regularly and irregularly performed, most apt reasons are to be taken. For besides the mixtures of *Nitre* with *Sulphur*, with *Tartar*, and with *Antimony*, all which are fired with a thundring noise; also *Aurum fulminans* or *fulminant Gold*, and a Composition of salt of *Tartar*, with *Nitre* and *Sulphur*, without any actual fire, being only thoroughly heated, are exploded with a vehement Crash; also to this may be referred, many Liquors, which being mixed together, or poured upon some certain bodies, cause or stir up violent motions, and plainly Explosive: The spirit of *Nitre*, and the liquor of congeled *Antimony*, being powred on one another, or either of them thrown upon the filings of Iron, cause a great *Ebullition*, with heat and black smoke. It is commonly known, what heat or effervescency, and force plainly explosive, arise from fixed Salts melted together, and from acetous or sharp salt of every kind, mixed with one another: Nor is the effect of Explosion less seen, when a Liquor imbrued with a volatil Salt, as the spirit of Harts-horn, or of blood, is put to a saline, either fixed or acetous *Stagma*, or sulphurious *Nitre*, to wit, the particles being vehemently stricken one against another, leap up with a force, and on every side are carried forth, a great

great way; which without doubt, if they were restrained within the space of any body, as the *fibres* of a Muscle, they would suddenly intumifie it, and so would constitute an Instrument of Local motion. Concerning this thing, we have more fully discoursed already in our *Neurologie*, or Tract of the Nerves, and perchance we may yet publish the explication of this more fully and more accuratly some other time.

In the mean time that this opinion may not be thought altogether new, and that I have exposed it as a childe of my own brain, that had no other Patron, I will here shew you the assertion of the Famous *Gassendus*, which as it openly favours this our Hypothesis, and in some sort gave an occasion of it, so perhaps it will give to it some Authority. 'Therefore this Rational man, weighing in his 'minde, how much that force or strength might be, with which, not only the 'Arm, or Thigh, but the whole animal Machine, is moved, govern'd, lifted up, 'and carryed up and down: He adds, Who can easily comprehend that small 'thing, whatsoever it is, within the body of an Elephant, whether we conceive 'it to be a soul, or spirit, or any other beginning of motion, that it should be a-'ble to agitate such a bulk, and to cause it to perform a swift, and regular dance? 'and so much the more, for that, when as that small thing within that body, no 'longer flourishes, there is need of so much outward strength, to remove it never 'so little from its place: but indeed, the same fiery nature of the soul, serves 'chiefly to this, which, although it be a very little flame, it is able to perform 'within the body, by its own mobility, the same thing in proportion, that a 'little flame of Gun-powder does in a Cannon: whilst that it not only drives 'forth the Bullet, with so much force, but also drives back the whole machine, 'with so great strength. But indeed he says as to the spirits, which (like ex-'ploded Gun-powder) cause the agitation, it is doubtfull, whether it be they, 'which come from the brain, or those in the little tendons as it were of kin to 'them or springing from them, that are thought to do it: But although either 'of them concur, yet they seem to be more presently destinated to this office, 'which are those of the same kin or off-spring in the Tendons. There needs no more, it is declared, that the motive function depends on the *Elastick Copula*, of the animal spirits, and its decision or abating. But from this being supposed, (which indeed we may suppose with very great probability) it easily follows, that the Convulsive motions proceed from the like cause: For whosoever shall consider the sudden puffings up, the violent and strong Contractions, in the members and affected parts, yea sometimes the most impetuous concussions, and violent throws of the whole body, can conceive no less, than that very many heaps of the animal spirits are exploded, or thrust out, even as lightning breaking forth from a Cloud. Further from hence it may be Argued, by a reciprocal Argument, that because the Spasmodick motions are explosive, that therefore the regular are also produced by the explosion of spirits: But after what manner, and by what means, and from what causes, the animal spirits being exploded, or thrust forth; produce Spasmodick affections, shall be our present business, a little more largely, and plainly to demonstrate, however difficult, and abstruse the matter seems to be.

The Conjunct Cause of Spasms.

Not repletion or fulness or inanition or Emptiness.

We will not here stand to recite many opinions of others, concerning the Nature, and causes of a Spasm, or Convulsion; that which was most common, and long famous among the Ancients, that this distemper was only produced from repletion or inanition, or from fullness or emptiness, (however, besides the authority of *Hipocrates*, for the establishing of this, an example is brought, of a Skin, or the strings of Lutes, which are wont to be contracted, being either filled with a moist, or empted by too dry an aire) easily falls of it self; because it seems to suppose (that which is credible to none by Experience, the fragility of a *Nerve*) to wit, that the *Nerves* themselves, after what manner soever *abreviated*, and contracted, are able with a certain force, to draw to them the Muscles. If that it shall be said, that repletion or inanition, ought to be understood, in respect of the solid parts, which are wont to be drawn together; it may be observed to the contrary, when as the Muscels and Nervous stock, are very much watered with a watery humour, as in an *Anasarca*, or are plainly destitue of the same, as in the Consumption, or Mirasmus; yet no Convulsive motions are for that reason excited: among the moderns, very many have determi-

ned, irritation of the Nervous parts, to be the cause of Convulsion; taking their Conjecture from thence as I suppose, for that by ocular inspection it appears from the Vellication it self, and by the only touch of the Nerves, that spasms are induced: And indeed we have clearly observ'd, in the dissection of a living whelp, that the knife being put upon the naked ends of the spinal Nerves, presently both themselves, and the Bodies of the Muscles, in which they were inserted, were hauled: neither is it unusual, that spasms are excited almost in every man, by the punctures of the Nerves and Tendons. I remember by reason of an Ulcer, in the Arms of a certain man, that the Tendons of the Muscles were laid open, which when touch'd by the Surgions Instrument, caused in the Patient a certain rigor, through his whole body, and forthwith a Concussion arising, made him to quake for a good space. But in truth, albeit we grant the irritations of the Nervous parts, not seldom to serve the turn of the evident Cause, and further that sometimes this solitary Cause, produces more light and transient spalms; nevertheless, that the more grievious paroxisms of this Disease, and their frequent repetitions by turns, may be duly unfolded, it behoves us to investigate, or search out other, and deeper Causes, to wit, the Conjunct and procatartick Cause.

Forasmuch, as spasms never happen but in a living Body, where the Nervous parts are blown up, and grow turgid with the animal Spirit, we may readily Conjecture that those animal Spirits themselves, are, as in regular motion, so also in the Convulsive, the next Instrument of Action: to wit, so long as they are imbued, with a fit and moderate explosive *Copula*, and are moved to that striking forth, only by the Command of the Appetite, or instinct of Nature, they bring forth motions altogether regular; but if the same Spirits get to themselves an heterogeneous *Copula*, and too much Elastick, or if they are snatched into their Actions, more impetuously and vehemently than they should be; they even like unbridled Horses, pricked forward with Spurs, leap forth inordinately or throw off, or explode violently their *Copula*, although genuine and natural: and so they carry away the containing parts, as it were a Chariot tied to them, together with themselves, with a fierce and perverse motion.

There is a double Cause and two kinds of Spasms. Irritation.

When therefore as aforesaid, the Convulsive motions are chiefly stired up for two Causes, hence, as many *Species* of them are ordained. For first, it happens that a Convulsion is induced without a procatartick Cause, or heterogeneous *Copula*, first acquired only from a solitary evident Cause: For so a vehement passion, impressed on the brain, a dissolution of the parts, hapning somewhere in the Nervous stock, a spasmodick passion is suddenly brought upon some, whose brain and Nerves are of a more weak Constitution: for that the animal spirits do trouble the containing parts, the improportionate Object flying from them, and by striking vehemently their *Copula*, though very agreeing it blows them up, and so they pull others annexed to them: Spasms being after this manner excited, because the natural *Copula* of the spirits in them, is stricken more vehemently, they are after a manner explosive, which notwithstanding, quickly leave off, and very often pass away with moving of the viscera, or Members; only with a trembling, and some horror, into a fainting of the spirits. But Secondly, Convulsions, whose paroxisms are more grevious and stay longer, or are oftener repeated, seem altogether to depend on a procatartick Cause, or a previous disposition, and to arise from some other Conjunct Cause, besides Irritation. And therefore in this Case we suppose, that the heterogeneous, and greatly explosive particles, do increase with the spirits, acting in this or that region of the Body: then from this wicked Combination, and restless Collision of this kinde of matter, and the Spirits, frequent and vehement explosions being brought forth, the spasmodick Paroxisms are induced.

A preternatural explosive Copula.

But besides the Elastick *Copula*, which every where happens to the Spirits, from the arterous Blood, and from whose orderly explosion, the motive force is performed, according to the Beck of the Appetite, or instinct of Nature, in all the Nervous parts; (as we have elsewhere declared) also sometimes other kinde of little bodys, of a fierce nature, or rather like *Gun-powder* or *Nitre*, come to the Spirits, and intimately adhere to them, when frequent and suddain divorces of this matter, from the Embraces of the Spirits, happen from the mutual striking together of the particles, the conteining Bodys are variously blown

up

up, and so are thrown into Convulsive motions. In truth, as often as the Spasmodick Affection becoms habitual, that the Convulsive Paroxisms arise not rarely on their own accord, and without any evident cause, but still on every light occasion; the procatartick Cause of such a disease, consists in the evill disposition, of such a sort of animal Spirits: For neither is the Serous filth, or other less sharp humours, although deposited in the very ventricles of the Brain, or about the origine of the nerves, sufficient to stir up such a sickness: For that I have seen in the heads of dead people, oftentimes the middle part of the brain, and the very beginings of the Nerves, wholly covered with a limpid water, who, whilst they were alive, had neither the Epilepsie, nor Convulsive Motions: But to the producing or these motions, very active Bodys are required, such as are Saline, and Sulphereous, which being combined with the Spirits, and then on a sudden breaking from them, they imitate the combinations, and violent explosions, of particular mineralls. For indeed, if in regular and ordinary motion (as we have intimated) the Muscles cannot get a motive force, and elastick strength, unless a certain explosion of the animal Spirits be supposed, certainly much more lawfully may we assert, that, epileptick fits, and other admirable Convulsions, which still happen to be excited, complications of the same Spirits, with other very firce particles, and vehement elisions, or strikings of these, one against another, are required. But, as to this kind of Sposmodic *Copula*, because it differs from the natural and ordinary, which we have elsewhere shewn to be in regular motion, and to be supplyed from the blood; it behooves us to inquire, from whence it comes, and by what means, and in what places, it is wont to get to the Spirits.

As to the first, it is to be observed, that Spasmodick explosions do every way happen, not only in the muscles, to which only they are limited, which effect the regular motion, but also in the membranes, to wit, the ventricle, mesenterie, and other parts almost without blood: besides, that the explosions themselves, in the Convulsive Affection, though they are excited contrary to the will of the Appetite, and the manner of Nature, are far more vehement, and do longer continue, than in the regular motion: out of which it seems to be manifest, that the Explosive Spasmodick Copula, doth come from some other place, than the Effectrice of Regular motion: And indeed, it is probable, that, that flows not, as this, from the arterous blood, running every where among the musculous *fibres*, but descends from the Braine, with the Liquore watring the Nerves, and so is heaped up, about their beginnings, middle, processes, enfoldings, and Extremities, as it were the mine of the Convulsive disease. Indeed nothing appears more evident, than that the Spasmodick Disease, doth most often arise, by reason of the evill first fixed in the Brain, and from thence is transmitted, into various parts of the Nervous System: for it happens from hence, that a vehement Passion, as of fear, or Anger, or of Sadness of spirit, affecting the inhabitants of the *Encephalon*, the passion called Hysteric, and Hypochondriac, doth so often arise: Further, that in the evill Crises of Feavours, when the adust recrements of the blood, are transfer'd into the head, Convulsions do generally succeed. Moreover, and this is the reason, why the Vertigo, the inflation of the head, torpor of the minde, and other accidents of the Supreme Region, are wont to be the *proœmium*, of Spasmes presently following, in the Inwards, and not seldom, in the whole Body. Wherefore it is not to be doubted, but that the heterogeneous, and explosive particles, are instilled from the Blood, together with the nervous juice, into the Brain; which afterwards being thrust forth, into the nervous stock, do there grow to the Spirits, and with them bring on a Convulsive disposition. In truth, the Spasmodick distempers, which are either universal, or at least occupie many parts of the body at once, arise for the most part, by this only means. But in the mean time, we will not deny, but that particular Spasms, which contain themselves within Certain places, the Head being no ways affected, are induced sometimes by other means. For if the nerves imbibe their humour from either end, to wit, the root, and the extream fragments, (which both the learned *Glisson* maintains to be most likely, and by us is shewed in our Neurologie, not without great probabillity) it may be from hence inferr'd, that the Spasmodick particles are broght inwardly, not only from the beginning of the Nerves, but somewhat also by their extremities: Therefore that perhaps appears clear and

The explosive Spasmodic Copula not immedatly from the Blood but from the Brain.

Sometimes received from the ends of the Nerves.

plain enough, that from the spleen being evilly affected, Spasms arising about its region, do not seldom affect the *Hypochondria* and *Præcordia*. I have known some, from a tumour or ulcer existing in the Mesenterie, womb, and other inwards, were wont to have Convulsions, both in the grieved part, and also all about it; the reason of which seems to be no other, than that the heterogeneous particles being more plentifully heaped up, in the affected place, Creeping also into the nervous *fibres*, planted nigh thereunto, supply them with matter for Convulsive motions like to fired gunpowder: But indeed, Spasms arising from such a cause, are not wont to diffuse themselves far about, nor always to ascend to the Head.

These things being thus premised, concerning the inward and next Cause of the Spasmodic Distemper, which we affirm to arise chiefly, and most often, from the head it self, and in some respect also from the extremities of the Nerves, it now remains, that we more particularly declare, the Various remoter Causes in either Kinde, and the manifold provision of this disease. The Convulsive Disease therefore, for the most part, takes its original from the head: to wit; as often as the heterogeneous and explosive particles, being diffused from the blood into the Brain, or its medullarie Appendix, are afterwards derived to the nervous stock, and there grow together with the Spirits: But this happens to come to pass from various causes: for there are very many ways and means, whereby the morbifick matter is admitted into the head, and very many also, whereby it is deduced into this, or that region of the nervous System; and according to the various translations of this kind of morbifick matter, the divers kinds of Convulsive motions are constituted.

The more remote Causes of Spasms.

Therefore, that the Heterogeneous and Spasmodick particles are admitted into the Encephalon, it is to be imputed to the fault, both of the blood sending, and of the Brain receiving it.

1 The mortifick matter is heaped up within the Head, by the default both of the blood sending it.

1. When the Blood powrs upon the Head the morbifick matter, either all its whole mass is depraved, as it frequently happens in malignant feavours, also in the Scorbutick, cacochymick, and chiefly in an originally corrupt Distemper; or the Blood of it self innocent and incorrupt, receives elsewhere malignant little bodys, and afterwards fixes them on the brain, so in great impurities of the Inwards, and chiefly when any parts are affected with an Inflamation, or virulent ulcer, or hurtfull ferment, for from such mines the taint of the disease, the noxious particles bubble up into the blood, and afterwards, in its passage, are laid up in the Brain: So, by reason that the spleen, womb, and other Inwards, being evilly affected, Convulsive Diseases are excited, which notwithstanding, depend more immediatly upon the Brain, receiving the corruption of those parts, through the commerce of the Blood.

And also of the brain receiving it.

2. But in the second place, the Blood however vitious it should be, and impregnated with the morbid seed, it could not easily leave its Infection on the head, unless there were some fault in the Constitution of the brain, and its Appendix; as long as these parts are well made, and are full of vigour, they defend themselves, and what belongs to them, and the doors being shut, they admit nothing but an unmixt spirituous Liquour, destinated for their use: but if either the passages, and pores of the Brain are too lax, or the door-keeping Spirits leave or are called off from their watches, an heterogeneous and morsific matter, creeps in together with the nervous juice, and unfolds its malignity, in the animal government. As to the evil disposition of the Brain it self, it is sometimes hereditary: So those sprung from parents obnoxious to the Epilepsie, or Convulsions, are themselves for the most part prone to the same Distempers: and indeed, the Constitution of the brain, may several ways become vitious from the birth: for either its temperature is more moist, or more dry than it should be, or it may be faulty by the excess, or defect of either Quallity. Sometimes the pores are more lax, or its consistency is too soft, or too hard: and also the Conformation of the parts of the Brain, and its Appendix, may be after an undue manner; But sometimes, the disposition of the Brain and Nerves, originally whole, and firm, is vitiated by accident, and acquires a morbid inclination: long Intemperance may enervate these parts: as also malignant feavours, and chronical Diseases, very much debillitate them: besides outward accidents, as the excess of heat or cold, an ulcer or a blow oftentimes perverts their Crases, and renders them more incident

The evil disposition of the brain is either hereditary

Or acquired.

dent to the impressions of Diseases. But as to the Constitution or irregularities of the animal Spirits, by reason of which, the heterogeneous and Spasmodick particles, enter the brain without any repulse, and more easily cleave to it; it is to be observed, that the animal Spirits are in some more tender, and easily dissipable, from their very birth; so that indeed, they are not able to suffer any thing very strong or vehement, to be brought to the sense or Imagination, but strait they fly into confusions: For this Reason, women more than men, and some of them more then others, are obnoxious to the passions called Histerick. Further, sometimes a violent Passion, impresses on the spirits, though moderatly firm, this kind of dissipation and inordination, so that afterwards they are able to suffer nothing strongly, or to resist any injurie: So it often happens, that morbid impressions are affixed on the animal *regimen*, by sudden fear, or great sadness, which can hardly ever after be blotted out: for from hence women often contract first the Diseases named the *Mother*, or from the *Womb*, and men the *hypochondriack*, and are for the most part still subject to them.

From these things it appears, after what manner, and for what Causes, the Spasmodick Matter is wont to be admitted into the Head: now let us see next, what is done with it afterwards; if that this matter brought to the Brain, induces the Convulsive distempers, either not always, or not altogether, after the same manner.

2. How the morbific matter being admitted within the head is disposed.

1. It sometimes happens, that the heterogeneons and explosive Particles, are admitted into the Brain, which notwithstanding are again exterminated, without any great hurt, and before they enter into the nervous stock: for that the veins and Lympheducts, or water-carrying Vessells, often sup up what is superfluous, and an enemy to the animall dominion, and convey it forth of doors, or dispose of it into Emunctuaries, or Sinks. Whilst such a matter is for a little while agitated in the brain, its particles being affixed to some of its Spirits, and at length striking against them, cause the *Virtego*, and the swimming in the head; but because they enter not into the passages of the nerves, Spasmodick Distempers do not follow.

Sometimes it is carried back again from the brain.

2. When the morbifick matter is admitted within the Head, and not presently from thence sent back, oftentimes it produces not its evill, till it is inserted into the stock of the Nerves; for the animal Spirits within the Brain, being as yet strong, and having got a more free space, they evade the embraces of every heterogeneous *Copula*; which indeed they are not able to do, within the strait channells of the nerves: Besides, the morbifick matter it self, if it cannot be sent away out of the Brain by the excretory vessells, it is by and by sent forth to the System of the nerves as the more ignoble part: but if in spite of the force of the superiour faculties, such a matter stays long within the brain, it much infects the Spirits that inhabit it, and induces the *Epilepsie*, as shall be more particularly shewed hereafter: but more often, the hurtfull matter is thrown on the nervous stock, from the brain, without much harm to it, but this happens to come to pass, not always after the same way.

Sometimes it is thrust out into the nervous stock.

Remaining in the brain causes the falling-sickness.

For truly, the heterogeneous Particles, being mixed with the nervous Liquor, and fallen towards the beginings of the Nerves, do not indifferently enter all of them together, or these, or those, as chance shall guide them, but they are directed to the passages of some before others, and that not without some Reason. For we observe, that the Convulsive Symptoms, do choose for the most part one place in children, another in riper years, and a different one in more tender, than in the more rebust.

The spasmodic matter being fallen on the nervous stock.

In children, who are not yet accustomed to the Affections of the Heart, and exercise of the outward members (whereby the morbifick cause may be further carried from the brain) the Spasmodick matter runs more often into those neareſt Nerves, *viz.* the third, fifth, and sixth pares; wherefore, their faces and mouths, and those parts, are chiefly handled: and it is rare and unusual for them, to have their *viscera*, and *præcordia*, lifted up, or affected, with an inordinate motion, as in those of riper years: on the contrary, in men of more advanced years, by its approach to the intercostals, and the Nerves of the wandring pare, it being more open to those of the spinal marrow, which those nerves respect are wont to be more frequently pulled: but yet with this difference, that in the more tender, and those who are very delicate, and subject to passions, and who by reason of the

Afflict the foreparts of the Nerves in Children.

Otherwise in those of riper years.

the passions of the minde, have very often their *præcordia* and *viscera* disturbed, the Spasmodick matter, more readily enters the more open passages of the interiour Nerves, and therefore, they are rendred more obnoxious to Spasmes, stirred up in the *Abdomen* and the *Thorax*: for hence it is that women are molested with the passions called Hysterical, and some men with the *hypocondriack*; as shall be more largely declared hereafter, when we come to treat particularly of these Distempers.

After what manner it disturbs the spirits, whilst it stays near the beginnings of the Nerves, or being fallen more deeply into their passages.

When the Spasmodic matter falls upon the heads of some nerves, or remaining there, it creates only a giddiness, and lighter *Spasmes*, and leapings of those parts, to which these Nerves belong, or being slidden more deeply into the pipes of the Nerves it brings forth more cruel Convulsive Paroxisms: but the same being dilated, into the nervous processes is disposed through one or more of the branches of the stock, or Trunk, sometimes all, and sometimes only those more open than the rest, and by degrees cleave to the Spirits, both within those Nerves, as also to those planted within the hanging *Fibres*: so that it is after the same manner, and there is the like preparation in the disposition to Convulsive *Paroxisms*, as if grains of Gunpowder were laid in a long train to be fired successively: The Spirits after this manner imbred with an heterogeneous *Copula*, are lodged within the *Fibres*, interwoven with the membranes, and Muscles, but chiefly within the nervous foldings; and when they grieved with too great plentitude, or troubled on any other occasion, are compelled to shake off their *Copula*, the particles striking and leaping one against another, hugely blow up the containing parts; and so excite a motive force, contrary to the commands and Laws of the Appetite, and Nature: Besides, the Spirits once stirred up, to the performing Convulsive motions, begin their explosions, from the one or the other extremity, of the nervous System, but for the most part at the end. But they who are first explosed, snatch or take with them their neighbours, also prædisposed, like a fiery train; and so they propagate the begun affection, with a long, continued *series* of Spasms, from one end to the other: For a convulsion begun in the bottom of the belly, or at the foot, or hand, creeps by degrees to the upper parts, and for the most part to the head it self: and the same Distemper, when it begins in the brain, (as in the Epilepsie) is derived in like manner thence downwards, to the remote Viscera, and also to the exteriour members and Limbs.

The spirits enter into explosions, by reason of plenitude or irritation.

The Spasmodic matter causes Convulsions either continued or periodical or by fits.

The morbifick matter, flowing in the heads of the nerves, produces divers kinds of convulsions, according to their various plenty and dispensation; for first of all, it is to be observed, that the whole passages of the nervous System, or of some of its parts, through the abundant, and exuberant matter, are sometimes possessed, so that the animal Spirits, both flowing in, and there implanted, being full of an heterogeneous *Copula*, and a perpetual supplement of it, are urged into continual Spasms. I have known some, who have had all the muscles and tendons through their whole body, afflicted with Contractions and leapings without intermission: I have known others whose thighs, arms, and other members, were perpetually forced into various bendings, and distortions: and also others I have seen, who of necessity were compelled to leap and run up and down, and to beat the ground with their feet, and hands; and if they did it not, they fell into cruel Convulsions of the *Viscera* and *Præcordia*: 2. If the explosive and heterogeneous Particles, be combined with the Spirits in a lesser plenty, they stick to them without tumult or perturbation, untill after some time, both Particles leaping again one from another, and from their striking one another, raise up Convulsive paroxysms; which sort of Paroxysms are periodical, and are repeated exactly at certain hours; which happens by reason of the morbifick matters, being dayly poured upon the nervous stock, with an equal dimension, and therefore about the same space of time, it is also dayly heaped up to an explosive plenitude; or they are wandring, and uncertain, in others, for that the heterogeneous particles, are poured in with a lesser company, and so arise not to an explosive fullness, under a long time; when in the mean time, the more full heaping of them together, and their explosion, are wont to happen sometimes more often, and sometimes more seldom, by reason of several occasions, or evident causes: hence it comes to pass, that the Spasmodic Distemper is sometimes altogether attributed to the evident cause, when indeed, if a more remote convulsive cause had not gone before, such a cause had stir'd up none.

Therefore,

Therefore, that we may say something of the evident causes of Convusions, we have already observ'd, if they be more vehement, and happen to a weak and tender constitution of Brain, and nervous stock, they are sometimes solitary, or of themselves cause convulsive passions: but as often as the Spasmodick Distemper is heavier, and being made habitual is wont to return oftener, though the evident Cause be manifest, and bears the blame of the effect, nevertheless it is to be suspected, that a procatartick, or more remote cause exists, and is the more strong efficient, though it lies hid within: for unless the Spirits are imbued with an heterogeneous *Copula*, they would not be so easily, nor so often, driven into involuntary, and præternatural Explosions.

The Evident causes of Spasms.

We meet with a double order or *Classes* of Evident causes; for either they are of that sort which increases the procatarick or more remote, and brings it sooner to an explosive fullness, as are an ill manner of living, and errors in the six *non*-naturals, which by infecting the blood, and nervous juice, heap up to a Saturity, in greater plenty, on the Spirits heterogeneous particles, and by that means do the sooner procure Spasmodick accessions. Or 2dly, the evident cause is said to be, whatever stirs and irritates suddenly the spirits, that they presently fall into explosions, and whatever it be, that causes them to strike off their *Copula*, and of this sort there are very many accidents, that provoke the spirits, planted now within the Head, and now within the nervous Systeм, to convulsive motions by a divers instinct (as is wont in the regular motions) which motions are either direct, or reflected.

The Evident Cause twofold viz. Filling and Irritateing.

The irritateing Cause, stirs up Spasms, direct, or reflected.

1. Of the former kinde chiefly are violent perturbations of the minde, wherewith the spirits of the brain being agitated and confused, they excite others lying within the nervous stock, and often prædisposed, to irregular explosions, so a vehement fear, anger, or sadness, do not only introduce epileptical and hysterical fits, to those that are disturbed in their health, bnt sometimes cause to divers others, palpitation, and trembling of the heart, and also horrid convulsions of the members and Limbs. 2. As to the other kinde of evident cause, to wit, whereby Spasms are excited by a reflected Act, this indeed comes to pass not unfrequently, as often as any heavy trouble, with an irritation of the *fibres* and spirits, happens any where to the nervous stock: for that this trouble being by and by communicated, to the chief fountains of the Spirits, to wit, the brain or Cerebell, from thence inordinate and violent motions, against the will of the minde, that is convulsive, being begun, they are returned back, for so either worms, physick, or sharp humours, cruelly hauling the coats of the Intestines, cause spasms in those parts, and not seldom in the outward members.

So much for the several kindes of causes, the conjunct, procatartick, and evident, whereby convulsive Diseases, becoming habitual, and are wont to be repeated with more grievous Paroxisms, do arise: But as we have assigned another species of this Disease, where the Paroxysms depend on an evident solitary cause, or at most only from irritation, the Spirits being not yet præoccupied with an explosive *Copula*: it is now next to be inquired into, by what, and how many ways, this may come to pass. Concerning this in general, it is affirmed, that the Spasmodic fits produced by mere irritation are either lighter and quickly passing away, or more grievious and not seldom deadly, as when poyson is taken, or when they come upon an overpurging medicine. Moreover it is noted, when the morbifick, or irritative matter falls upon the tales themselves, or the foldings of the nerves, that it also not rarely becomes explosive, and so Spasms produced also from mere irritation (as we have already noted) are certain explosions; these being thus premised, we will dispatch the business in hand.

The irritateing Cause distinguished, as to the places affected, as to the subjects.

The irritation of the Nervous parts, which is wont to cause convulsive motions, happens in various places, and from various matters, which are incongruous and inimical to the spirits, and *fibres*. As to the things, enemies to the Nature of the spirits, you may observe, besides poysons, and the excess of cangible qualities, which are inflicted from without; many things which are begot within us, *viz.* the various recrements of the blood, and nervous juice, feverish taints, præternatural salt, or sulphureous humours, yea worms, the stone, with many other things, to be infestous to the nervous stock, and ordinarily to stir up Spasmodick irritations. As to the places affected, or the seat of the irritative matter, although this brings hurt in any part of the nervous Systeм, yet for the most part, it is

The places affected, are the beginnings the extremities, and the middle processes, and foldings, of the Nerves.

wont to become moſt infeſtous, when it is fixed near the beginnings, or the ends of the nervous Syſtem, or about the middle proceſſes of the Nerves, and eſpecially in their foldings: Beſides, ſuch a matter, which irritating the Spirits, is wont to have the place of an Evident Cauſe, doth not ſeldome become, as we hinted but now, the means of a more remote cauſe, foraſmuch as the heterogeneous particles, being ſent from it, enter into the nervous *fibres*, and being combined with the Spirits, renders them more apt and ready to be exploded.

How the irritating Cauſe affects the origine of the Nerves.

1. Therefore, it ſometimes happens, that malignant humours, and infeſtous to the nervous ſtock, being poured out from the blood, on the region of the brain, and from thence dilated to the hinder region of the Head, do fall upon the *origine* of the nerves; where, if the little skin, which cloathes the oblong pith, be broken, they fall into the naked trunks of the nerves, and enter deeply into their *fibres*; wherefore indeed, *Convulſive motions* ariſe, not only in the neighbouring parts of the head, but ſometimes in very remote, and not rarely in the whole nervous Syſtem: This is generally obſerv'd, in evill *Criſes* of feavours, the morbifick matter being tranſlated to the head; alſo in cephallic Diſtempers, being brought to the worſt and deadly ſtate. Truly, when I have opened the heads of thoſe, who have dyed by this means, I found in all of them, the hinder Region of the oblong pith, immers'd with a ſharp, and ſalt *Serum*.

How the extremities of the Nerves.

2. As the interiour extremity, or original of the Syſtem, ſo not rarely the exterior, or the end, from a vellication or hawling there made, begets Spaſms, or Convulſive motions, and transfers them on every ſide: that this is done ordinarily in the outward members, the prickings of the tendons, and Nerves, do teſtifie. No leſs are Spaſms wont to be excited every way about, from a vellication or pulling, made in the *Viſcera*, when at any time Medicines, or ſharp humours, alſo worms lying in the Ventricle or Inteſtines, pull the membraneous part, and ſo impreſs a troubleſome ſenſe on the chief ſenſories; preſently from thence, by reaſon of the firing of the ſpirits, *Convulſive motions* torment now the affected parts, and now indifferently any other parts: for oftentimes Spaſms, from the more grievous hurt of ſome Inwards, do not only imploy the affected parts, and their neighbours, but alſo the Muſcles of the face and mouth, and are likewiſe transfer'd to the exterior members. The ſtone impacted in the Uriters, cauſes not only cruel Contractions in that paſſage, but in all its neighbourhood. Moreover, ſome hyſteric and other hypochondriac Symtoms, are ſometimes induced by this means, foraſmuch, as by a vellication made in the membranes of ſome *Viſcera*, thence the Spaſm is returned back.

How the middle proeeſſes and foldings.

3. The irritative matter, which is wont to be the Evident Cauſe of Spaſms, ſometimes occupies the middle proceſſes of the nerves; and therefore the parts, ſometimes above, ſometimes beneath its ſeat, are incited to convulſive motions: This appears plain enough in the foldings of the Nerves; for when the ſharp recrements of the nervous juice, are laid up in them, they do not rarely create Spaſms, through the whole neighbourhood: by this means, the Collick or Hiſterick Diſtemper, is often ſeen to be begot or excited, there being no fault in thoſe Inwards, only from the humours, depoſited in the foldings of the meſenterie, as we will ſhew hereafter, when we come to treat of thoſe particular Diſtempers. In like manner, by reaſon that the ganglioform foldings, being ſtopped up with a ſharp and irritative humour, perfocation or choaking in the Throat, and various Contractions of the *Præcordia* are cauſed. Beſides, Spaſmodick Diſtempers do not ſeldom depend, upon a ſharp humour within the whole trunks of the nerves, and filling the paſſages of the nervous Bodys. We have ſeen ſome troubled with admirable, and perpetual Convulſions, ſo that they have been forced (as we have already mentioned) to run about, to leap, to fling about, and diſtort their members, to ſtrike the ground with their feet and hands, and to exerciſe other ſtrange geſtures, even as if they had been bewitch'd; the genuine Cauſe of which kinde of paſſion, ſeems to conſiſt in this, that the Juice watering the nervous ſtock, being moſt ſharp like ſtygian water, and being become degenerate from its due *Craſis*, doth irritate continually, and as it were poſſeſs with a certain madneſs, the Spirits therein flowing, and implanted.

The difference of Spaſms in reſpect of their origine.

From theſe things, which we have diſcourſed, about the various cauſes of Convulſions, their manyfold *Species* and differences are made manifeſt: For firſt, we have made known, that Spaſmodick Paſſions are moſt often derived, in reſpect of their

their *origine*, for the head, being affected; or the morbific matter, flowing into the beginnings of the Nerves: yet sometimes, though more rarely, they depend upon such a matter, Creeping into the extremities of the nerves.

Of their Causes

2. As to the production of the Disease and symptoms, we observe the same sometimes to be produced, from a solitary evident Cause, as a sudden and vehement Passion: but indeed more often, to require a more remote, or procatartic cause, or prævious disposition: moreover, the causes sometimes so to interfeer, that the procatartick, also may supply the place of the evident cause; and also, on the contrary, that this may serve in the place of the other.

3. As to the extention of the Disease, the Convulsive Distemper may be distinguished into *Universal*, because the Spirits actuating the whole nervous System almost, and the *Encephalon* it self, are successively exploded; and *Particular*, in which the Spirits, within some private Region of the Animal Kingome, are disturbed.

Of the extent of the disease.

1. The former is meant, when the animal Spirits are irritated, within their first fountains, to wit, the pith of the brain, and cerebell, from whence their violent explosions happen; wherefore every internal function of the soul, to wit, the sense and Imagination is obscured, and its exterior locomotive faculty perverted: This kind of universal Spasmodick Distemper, in which, besides the spasms of the Limbs and *Viscera*, the interior powers of the Soul suffer an Ecclipse, is again twofold: to wit, either primarie, which begins at the Head, and arises, forasmuch as the Spirits inhabiting that place, being imbued with nitro-sulphureous particles, are first exploded, and their inkindling snatches or takes hold of the rest, flowing in both the medulary and nervous *Appendix*, and there stirs up Convulsive explosions, as may be discerned in the Epilepsie.

2. Or this universal passion, causing Insensibility is Secondary, to wit, which being begun somewhere in the nervous stock, from thence, plenty of spirits being successively affected, becoming like the undulation or moving of waters, is at length carried to the head it self: this often happens in paroxisms called hysterical, in which, by reason of the Spasm begun at first in the bottom of the belly, or some intumescency or rising up in the *Abdomen*, then, the same spreading higher, with the same effect, through the pipes of the Nerves, the Ventricle, and by and by the *Præcordia* are drawn together, and at length, the Spasm forceably rushing to the Head, the patients fall down, and all Knowledg is taken from them, and lastly, the Disease being reflected into other nerves, Convulsive motions of the exterior members succeed.

2. But as to the particular Spasm, in whose fit the sick continue well in minde, this Indeed is distinguished into various differences. As to the seat of the matter, which happens about the beginnings, extremities, or middle processes of the Nerves (as we have shswn) there arises a difference: For even as this morbifick matter, beseiging the beginnings of the nerves, is fixed about the head, middle, or end of the oblong pith, it therefore happeneth, that sometimes only the parts of the face or mouth, sometimes the *Viscera* of the lower, or middle Belly, and again sometimes chiefly the outward limbs, are hauled together.

Of the duration of the Fit.

Further, a Convulsion, as to the duration of the fit, and its magnitude, uses to be distinguished, into a continual, and Intermitting: The former, as we have already hinted, is called *Tenasmus*, or a permanent Contraction, as when one part, or more, being Contracted or distorted with a constant stretching, are detained for some time in the same præternatural posture; so, when the muscles, or a member, suppose the eye, Lipps, Cheeks, are distorted from their right position, nor cannot easily be presently reduced: the cause of which is sometimes a resolution, or Palsie, in some other muscles, which when they are loosened, the opposite do too strongly Act, and draw forceably the whole part, towards themselves, which ought to stand, as it were betwixt them, in au equall ballance: but sometimes, such a permanent contraction, is excited, by reason of the tendons being stopped with an impacted serous humour, which become for that cause stiff: This Kinde of Distemper becoms very familiar in the Scurvy, that the sick sometimes are not able to extend any member or Joynt, but they are contracted round like a globe. Sometimes the Tendons in the back by reason of such a course of humour, draw the bones out of their due scituation, and cause a gibbousnes, or bending out of the Body. The *Tenasme* is wont to be distinguished into uni-

verſal, of which there are three Kinds, to wit, *Tenſion* forward, *Tenſion* backwards, and *Tenaſmus* properly ſo called; and Peculiar or particular, which chiefly reſpects ſome certain member or joynt: we will ſpeak of theſe diſtinctly hereafter.

2. The intermitting Convulſion, is either ſhort and momentary, which is acted by frequent turns, and as it were by little leaps, as is to be obſerved in the quaking and ſhakings of the Tendons in horror, which are to be diſtinguiſhed between, with a frequent alternation of motion and reſt: or the leapings of the Spaſms, and their intervals, are drawn out longer: So it is uſual, for Convulſive paroxyſms, when they are repeated, to endure for ſome time, and to leave off again; but ſuch periods are now certain, or come to certain ſet hours, now rare, and incertain, and happen after a divers manner, and as various occaſions are given. There are other differences of this diſtemper, which will be better illuſtrated hereafter, when we ſhall ſpeak particularly of each kinde of Convulſions.

CHAPTER II.

Of the Epilepſie.

THus far we have treated, of the Nature, Cauſes, and differences of Spaſms, or Convulſions in general according to a clean, new, and unuſual *Hypotheſis*, but (as I think) agreable enough with Reaſon: our next buſineſs is, to explain particularly the chief kindes of that Diſtemper; amongſt which the *Epilepſie* eaſily deſerves the preheminence, and the Conſideration of it ought to proceed, by a certain right of method and order; for that this Diſeaſe, having as it were got a large Empire, in the humane body, exerciſes its Tyrranie, not only in the whole *Encephalon*, but for the moſt part, in all the parts of the nervous Siſtem at once: wherefore by the Ancients, it was called *Morbus Herculeus*, or the *Herculean Diſeaſe*, from the Cruelty of the diſtemper, and from the manner of the violent fits, as if ſent, as it were by ſome Divinity, being ſo amazing, *morbus Sacer*, or, the holy Diſeaſe, to which may be added, the Conjecture of a certain Divine of our own Country, of no ſmall note, to wit, that many, who were taken to be *Dæmonaicks*, or poſſeſſed with the devill in the New Teſtament, were only Epilepticks, and that they called the cure of this Diſeaſe by our Saviour Jeſus Chriſt, an ejection or exorciſm of the evill Spirit: In truth, in this Diſtemper, no marks at all, of the morbifick matter appears, or are ſo very obſcure, that we may have deſervedly ſuſpected it, to be an inſpiration of an evill Spirit, at leaſt it is probably, that as often as the Devill is permitted to afflict miſerable Mortals, with his deluſions, he is not able to draw more Cruel Arrows, from any other quiver, or to ſhew miracles by any better witch, than by the aſſaulrs of this monſtrous Diſeaſe.

As the Symptoms of the Epilepſie are very Stupendious, ſo their Cauſes, and the formal Reaſon of the Diſeaſe it ſelf, are moſt difficult to be unfolded. For indeed, the buſineſſe is variouſly controverted among authors, both concerning the part Affected, and alſo the manner of its being affected: many place its ſeat in the Brain, or its Ventricles, others in the meninges, or thin skins enwrapping the Brain, and ſome again in the middle, or loweſt belly, bnt by what right ſhall be inquired into anon: In the mean time, laying aſide the opinions of others, that the true ſpeculation of this Diſeaſe may be found out, by the clew af right reaſoning, we will firſt of all endeavour to give you its deſcription, together with the whole ſenſe of its *Phænomenas*. Secondly, theſe things being rightly weighed, to finde out the ſubject of the diieaſe, and its chiefly affected parts. Thirdly and laſtly, to add the means and manner. whereby this diſeaſe is begotten, with the true Cauſes of its Symtoms.

The deſcription of the Epilepſie, or the hiſtory of the Diſeaſe.

In the firſt place, As to the Idea of the Diſeaſe, the Epileptick Fit or aſſault, ſeems to be only an univerſal, and more cruel Convulſion, to wit, in which the Spirits inhabiting the Brain, being firſt irregularly moved, and as it were confuſed, all the reſt, dwelling in both the medulary, and nervous appendix of the *Encephalon*,

cephalon, begin at once Convulſive motions, or inordinate contractions, and continue them for ſome ſpace, with frequent leapings or palpitations: The acceſſion of the diſeaſe come upon them at unawares, and oppreſſes the ſick, not the leaſt thinking of it, and in the twink of an Eye, caſts them on the ground, deprived of ſenſe and underſtanding; for that they do not only fall, but are flung down with a certain force, ſo that oft times the part firſt ſtriken againſt the Earth, or other adjacent Bodies, is hurt with a bruiſe or wound; being laſt done, there comes upon them a gnaſhing of Teeth, with a foam at the mouth alſo, oftentimes the ſhaking of the head, and a frequent knocking it againſt the ground, the armes and thighs, yea, the hinder part of the neck, and back, either become preſently ſlit, or elſe they are diſtorted hither and thither, with various bendings; ſome Cruelly beat their breaſts, others ſtrongly thruſt out their armes and thighs, and fling them, and ſometimes the whole Body, impetuouſly here and there; many have their *præcordia*, and *hypochondria*, and alſo all their lower belly ſwelled, and blown up very much: after ſome time, ſometimes ſhorter, ſometimes longer, theſe Symptoms, the Tragedy being as it were acted, ceaſe, on a ſudden, and then the ſick come to themſelves, and recover their ſenſes: but after the fit there remains an akeing in the head, with a dulneſs, and hebitude of the ſenſes, and not ſeldom a turning, or giddineſs.

The *Epileptick Paroxyſms* are wont to return ſometimes at ſet times of the day, moneth, or year; and moſt Commonly at the greater returns of the year or Tropicks, or at the oppoſite aſpects, or conjunctions of the Sun, or moon, they are wont more certainly to return, and to afflict more grievouſly: ſometimes their comings or acceſſions, are uncertain, and wandring according to the occaſion, and variety of Evident Cauſes: there are alſo Fits or Poroxyſms, now more light, which quickly paſſe away, ſo that the ſick are ſcarce thrown to the ground, nor are carried into diſorder or inſenſibility; now more grievous, whereby they when taken, lye ſenſeleſſe the ſpace of an hour or more, and are tormented with horrid Symptoms, as if poſſeſſed with the Devil: Sometimes tho more rarely, ſome foregoing ſignes of the fit, warn them of their falling into it; as an heavineſſe of the head, a brightneſs of the eyes, a tingling of the eares: ſometimes a ſpaſm or cramp proceeds, in ſome exterior part, as in the arm, or thigh, or elſe in the back, or *Hypochondria*, which aſcending from thence, like a Cold air, and creeping towards the head, ſeems to bring on their falling down. Boys, and young Men are found to be more obnoxious to this diſeaſe, than old men, or men of mature age: who ever are once ſtruct down by its fit, unleſs they be cured by the help of Medicines, they will hardly be altogether free, from the infection of it, all their Life after; the more often the Fits are, the more grievous they become, which as they frequently return become more cruel, and enervate the uſe of the memory, Imagination, and Reaſon, and then the ſtrength, and force of the whole animal funcction, until its Occonomy being greatly perverted, the vital fuuction at length decays, and by degrees is aboliſhed. The weapons, and wicked preparation of this Diſeaſe, being after this mauner layd open, we will next make an inquiry, in what part it fixes its ſeat; or what is its next ſubject.

The ſubject or the ſeat of the Diſeaſe is inquired into.

The acceſſion of the Epilepſie, and the manner of invaſion, ſeem plainly to declare, that its primary ſeat, ot part chiefly affected, is contaiued ſomewhere within the Head; but that a Paroxyſm ſometimes begins in the remote parts, and from thence aſcends towards the head, which indeed ſeems only to be ſo, and happens by accident, when in the mean time, the morficick Cauſe ſubſiſts about the *Encephalon* it ſelf, (as ſhall be anon declared): but that from the firſt aſſault of the Diſeaſe, preſently a ſtrange Inſenſibility, and diſorder, with contractions almoſt of all the Members and *Viſcera* ſucceeds, it is a manifeſt ſigne, that the whole joynting of the *Encephalon*, and the original of all the nerves, are poſſeſſed with the morbifick Cauſe: But truly, although it ſeem moſt difficult, to unfold where this cauſe, or morbifiek matter ſubſiſts chiefly; for, neither is it probable, that the ſame is diffuſed thorow all the parts of the Brain; yet it neither appears in what ſingular place this being fixed ſhould draw all the other parts ſo ſuddenly into a Conſent of its evill.

Some affirm it the Meninges or thin skins of the Brain, other the pith or middle part of the Brain.

Among the various opinions of Authors, about this matter, there are two that ſeem more probable than the reſt, and challenge an aſſent with an equall likelineſſe to Truth. One of which aſſerts the very middle of the brain, and the other

the meninges, or the thin skins encompaſſing or cloathing it, to be the primary ſeat of the Epilepſie: The Reaſon of the former is founded in this, that where the fountain of the animal Spirits, and the original of the ſenſitive ſoul it ſelf conſiſts, there ought to be placed the cauſe of this Diſeaſe, certainly when the chief faculties are firſt hurt, all the reſt eaſily participate of the ſame evil: But in truth, though I may grant in the Apoplexy, and the *deliqnium* or fainting of the ſpirits, that it is ſo, yet it follows not in a Convulſion (of which kinde of diſtemper the *Epilepſie* is) that all the *fibres* and nerves ſhould be pulled together, becauſe the middle part of the brain is firſt pulled: for that this, as it is a moiſt aud fluid ſubſtance, and wanting of ſenſe and motion, ſeems not capable of contraction, or the Spaſmodick Diſtemper: wherefore others thinking the brain, and every part of it, free from the blame of this Diſeaſe, caſt it altogether on the meninges: affirming, that the membranes, cloathing the brain, and chiefly their proceſſes, ſpread upon the clefts of the brain, and *Ceribel*, as they are hauled by the morbifick matter, do conceive or beget Spaſms, or horrid Convulſions, and then that from the Meninges themſelves, ſo Contracted and brought together, the inclnded Brain is greatly compreſſed, and bound together, ſo that its pores and paſſages being bonnd up, the great amazing diſorder and inſenſibility is iuduced, and alſo the trunks of the nerves, to which either meninge or skin is faſtened, beiug brought into a conſent with them, enter alſo into Convulſive motions: And indeed after this manner, the formal Reaſon of the Epilepſie, may perhaps ſeem to be unfolded; but truly when I conſider further of the matter, I think we may differ from this opinion, becauſe it does not appear by what Courſe, or for what cauſe, the falling down being at hand, theſe meninges ſhould beget ſuch horrid Spaſms. Nay, it neither appears, how from them, however Convulſive thev be, the Epileptick Paroxiſm ſhould be induced.

It is affirned, that the meninges are not firſt of all affected.

As to the former, it ſeems an impoſſible thing, for the meninges to be ſo contracted, as to their whole Concavities, that being bound more ſtrictly together, like a purſe, they ſhould on every ſide pull together their contents, and draw them into a narrower ſpace: for that the *Dura Mater* ſticks moſt firmly to very many places of the skull, yea, and the *Pia mater* is tyed to it, near the proceſſes of the hollow turnings, by a mutual knitting of the membranes, and every where beſides with a Continuity of Veſſells: Hence it eaſily appears, either that membrane, as to the greateſt part of it, is immovable, ſo that they cannot fall into ſo univerſal Spaſms: but in reſpect of leſſer Spaſms, as when a certain portion of this or that meninge, or both together, is pulled, indeed we grant ſuch may happen: for I have often heard thoſe troubled with great headach, to complain extreamly of a great conſtriction of the parts, lying under the ſide of the skull, ſometimes on the right, ſometimes on the left, and yet from thence no aſſault of falling down, has followed: Further as thoſe membranes being notably hurt, do cauſe great vellications or haulings, yet upon it there is not wont to be an Epileptick fit to follow: for I have known, from an Impoſthume in the *Dura mater*, when being broken, and that the ſtinking matter had knawn the more tender meninges, and ſhell of the Brain, that the ſick have fallen firſt into an amazedneſſe, and at length into a deadly Apoplexie, who notwithſtandiug, in the whole courſe of the Diſeaſe, was free from any Epileptical Symtom. Alſo I remember, I have ſeen one, who had the *Dura mater* very much torn, by the inſtrument of an unskilfull Surgion, and another, that by a wound, had that with part of his skull takeu away, ſo that a portion of the Brain ſwelled forth, and yet to neither of them any Epilectical paſſion hapned: wherefore neither is it likely, that the blood, or humors, or (if any ſhall ſo argue) the vapours, compacted within thoſe meninges, can bring in any greater evill, than either a ſtroke, or wound, inflicted on them, or filthy matter there poured out: Beſides, thoſe who are more lightly troubled with the *Epilepſie*, ſo that they ſcarce fall down, and have their minds free through the whole aſſault of the diſeaſe, would perceive the membrans to be ſo contracted, and the globe of the brain to be more ſtraitly thruſt togeather, if there had bin any ſuch kinde of affection; but they on the contrary, ſeem to have the Brain as it were inflamed, and to be ſenſible, that the ſpirits leap forth, and are as it were exploſed, with a certain fierceneſs.

The ſpirits inhabiting the middle of the brain are the primary Subject of the diſeaſe.

And indeed, I think it is very likely ſo, that the Epileptick Paroxiſm is ſtired up, from a certain ſuddain rarefication, and exploſion of the animal ſpirits, inhabiting

biting the Brain, which are in truth the first, and immediate subject of this Disease; to wit, whereby the Brain it self is inflated, and rendered so insensible, and the Nerves hanging thereto, also put into convulsions: For hence it comes to pass, that the accession of this Disease begins so on a sudden, and determines perfectly without any great provision or remains, of the morbifick matter; because the Infection is not brought so much to the solid parts, as to the Spirits themselves.

We have already shown by what means, the heterogeneous and explosive *Copula*, consisting as it seems of *nitro-Sulphurous* particles, cleaving to the spirituous particles of the animal Spirits, and lastly, being smitten and explosed by them, by reason of plenitude or irritation, produces Convulsive Symptoms: But although this kinde of Spasmodick *Copula*, is first distilled from the blood into the brain, yet, for the most part, it does not take hold of the spirits there, or at least, it stays not long with them, in that place: but rather, being thrust from thence, towards the nervous *Appendix*, causes particular and respective Spasms, near the places affected: But sometimes, if the Spasmodic matter be more plentifull and strong, and the constitution of the brain weak, the heterogeneous *Copula*, being fixed to the Spirits, not only in the nervous stock, but also to those planted within the *Encephalon* it self, causes the Epilectick disposition; and the explosive particles of the Spirits, and this *Copula* knocking one against another, stir up the falling fit. For indeed, since the assault of the *Epilepsie* urging, the Insensibility, and great disorder is for the most part the first Symptom, and all the pathognomick, it may be concluded, that the animal Spirits, lying within the middle of the brain it self, are affected before others; and that therefore, that part, is the principal seat of the Disease: Then, forasmuch as the falling of the sick, or casting to the ground, and spasms of rhe members and *Viscera*, most often follow that Insensibility great disorder, or leaping forth, of the spirits, it follows that the animal Spirits also inhabiting the nervous System, are imbrued with the same explosive *Copula*, and are drawn into consent with those inhabiting the brain it self, and are excited by them, to explosions purely inordinate; although sometimes (by the whole *series* of Spirits, planted both in the brain and nervous stock, being like a long train of gunpowder, prædisposed to explosions) an exterior Spasm, beginning a great way off, perhaps in some member or Inward, may afterwards be carried to the Brain, as shall be more fully shown hereafter. In the mean time, it is concluded, that the region of the Brain it self, is always the primary seat of this Disease; and that we ought to suppose, the conjunct cause of the Distemper, not to be water heaped up within the ventricles of the brain, nor a thick or clammy humour, impacted in the passages of its pores: for such Causes are begotten by degrees, and therefore would shew some certain signes before-hand, of the first coming upon one: further, the assault of the fit being over, such a matter could not be wholly discussed in so short a time, but that from its reliques, some impediments of the animal function would remain, which indeed rarely happens in the Epilepsie, unless inveterate: but, for the exciting of the falling down, no less can be imagined, then that the animal Spirits, which flowing within the marrowie substance of the brain, perform the acts of the interior sense, of the Imagination, and appetite, having gotten an heterogeneous *Copula*, should be inordinately exploded, and so they being disturbed beyond their orders and stations, the Superior faculties of the animal regimen, must suffer an eclipse; then, from this greater explosion of spirits, as it were from a fiery enkindling, other Spirits, inhabiting the marrowy and nervous appendix, being also prædisposed to explosions, conceive the like disorder, and in like manner, cause the explosive Convulsive motions, of the containing Bodys.

The disease affects secondarily very many parts, of the Nervous System.

For although we conclude, that the middle of the brain, is always the primary seat of the Epilepsie, and that from the beginning, the morbific matter is layd up wholly in that Region; yet the distemper growing grievous, this being more plentifully spread thorow the head, enlarges its bounds, so that it being strowed here and there, and far and neer stretched out, Spasmodic particles, are cast into the rest of the Brain, and also into the nervous *appendix*, like gunpowder or explosive seed, whereby it comes to passe, that at the first approach of that disorder of Spirits, Convulsions follow, sometimes in these, sometimes in those parts, and not rarely thorow the whole Body.

CHAP.

CHAPTER III.

The Differences of the Epilepſie, and the reaſons of ſome of the Symptoms are unfolded. Alſo its Curatory Method is repreſented.

THus far of the eſſence, and the Cauſes in generall of the Epilepſie, it ſhall be now our next task, to explicate the differences of this Diſeaſe, alſo the reaſons of ſome of the accidents, and Symptoms, belonging to it: to which we will laſtly add, Obſervations and Hiſtories of ſick people, with the method of Curing.

The moſt notable difference of the Epilepſie, is wont to be taken from the Subject, to wit, that the brain, or part of it, labouring with this diſeaſe, is either primarily, and Idiopathetically, or properly, affected, or ſecondarily, and not but by conſent, with other parts: concerning the former kinde, we have hitherto diſcourſed, as to the other, to wit, in which the falling down ſeems to ariſe, from ſome place without the head, and then lays hold of it ſecondarily, and as it were by a blaſt ſent from elſewhere; it is to be obſerv'd, that this kinde of diſtemper (as *Galen* hath noted) proceeds either from the external, or internal parts: we meet with many examples of Epilepticks, in whom the fit being juſt coming upon them, a ſpaſm is felt, with a numneſs in the hand or toe, or other particular member, which preſently from thence, as it were with a pricking or tingling, creeps towards the head, which when it hath attained, immediately the ſick party falls flat on the Earth, and is hurried into Inſenſibility and diſorder of ſpirits, and other proper demonſtrations of the Symptom of the falling ſickneſs: neither is it a leſs uſuall *proæmium* of this diſeaſe, that there firſt ariſes as it were a conflict, in the ſtomach, ſpleen, womb, Inteſtines, genitalls, or other inwards; or that ſome kinde of perturbation is raiſed in ſome of them; then from that place, the aſcent of (as it were) a cold air is perceived, to which diſtemper, follows the acceſſion of the falling evill, with its moſt horrid proviſion of ſymptoms: hence it was commonly believed, that the cauſe of the Epilepſie, lay hid in the part, ſeen to be ſo primarily affected, and propagated its evil to the brain, of its ſelf innocent.

The Reaſon of the Epilepſie which is ſaid to be excited by conſent.

The Conjunct Cauſe of the Epilepſie conſiſts only in the brain.

But in very deed, as to this, we muſt ſay, that in every Epilepſie, not only the procatartick or remoter Cauſe, but alſo the conjunct, remains wholly in the Brain; to wit, that the ſpirits inhabiting it, being diſpoſed to exploſions, and there being exploſed, bring on or Cauſe every falling Evill. As to thoſe præliminary Symptoms in ſome Epileptical people, they ſometimes have the place of an Evident Cauſe, and ſometimes only of a ſigne: For when the evill diſpoſition of any inward, as the ſtomach, ſpleen, or womb, happens with the diſpoſition of the Epilepſie, as often as any perturbation is begun in that diſtempered Inward, it eaſily happens, by reaſon of a tranſmiſſion of the ferment from thence, or a continuation of the ſpaſm to the head, an Epileptical fit is excited in the Brain præ-diſpoſed to act.

But theſe kind of ſymtoms of the fallingevil, which being ſuſcitated from without, ſeem to propagate the diſtemper to the Brain, do often ariſe from the conſent of the Brain it ſelf, and are only ſigns of the approach of the Epileptical Fit, or of the ſpirits beginning to be exploded, in the brain: For when the animal ſpirits planted in the middle parts of the Brain, and Cerebel, and alſo thoſe in the oblong pith or marrow, neer the beginnings of the Nerves, are ſo filled with an heterogeneous Copula, that, for the Caſting of it off, they are ready to bring on the aſſault of the Diſeaſe, before they are all exploded heap by heap, ſome ſpirits lying more outward, in ſome private Nerves, becauſe they are deſtitute of the wonted influx of their ſuperiors, fall into certain inordinations, and ſo begin ſpaſms, which ſpaſms (as it is often the manner in this kinde of diſtemper) begin at the extremities or ends of the Nerves, inſerted to this or that member, or Inward, from whence by degrees, they creep forward to their beginnings; whether being come forth with the ſpirits, thorow the whole *Encephalon*, before diſpoſed to exploſions, being

being moved by that ſpaſms, and ſo being ſnatch'd away with a fiery enkindling, are ſuddenly exploded or thurſt out; ſo they ſeem to ſtir up the Epileptick Fit, beginning at firſt from themſelves, as it were ſecondarily, and by inſtinct, brought from ſome other place. After this manner, ſometimes the Hiſterical paſſions, when beginning in the bottom of the belly, they are Communicated to the Brain, are thought to ariſe from thoſe Viſcera, and to be ſtirred up by their fault; when in the mean time, the morbific cauſe ſubſiſts chiefly, about the beginnings of the Nerves, as we have elſewhere ſignified, and ſhall again ſhow hereafter, when we come to treat particularly of the Spaſmodick diſtempers.

Other differences of the Epilepſie.

There yet remain other differences of the Falling ſickneſs, to wit, that it is either hæreditary, or acquired; again, either kind is variouſly diſtinguiſh'd, by reaſon of the Age, or time, in which it firſt comes upon one, to wit, when the firſt coming of it happens before, or about the puberty, or being of ripe age, or after it; further as to the Efficacy of the diſeaſe, into ſtrong, and weak, for as much as the Paroxyſms or fits, are with, or without the diſorder of ſpirits, and falling, as to its inordinate manner, whoſe aſſalts are wandring, and uncertain, moreover, it is wont to be diſtinguiſhed, accordiug to the peculiar ſymptoms, in theſe, or thoſe ſick people, by reaſon of ſome diſpoſition, or manifold idioſyncraſy, or propriety, of the Temperament.

But from what has been ſaid before, of very many of the Symptoms, which are to be met with in this Diſeaſe, the cauſes do eaſily appear, ſo that there will be no need here, to conſider all of them: but of ſome of them, which ſeem more intricate, it will not be from the matter, to diſcourſe in this place.

Why Epileptick's fall down with violence.

We will therefore firſt of all inquire, why thoſe ſick of this Diſeaſe, do not fall as thoſe that are apoplectick, or have ſwounding fits, but are rather ſtricken down with violence, againſt the Earth, or any other bodys, that are by chance oppoſite to them, as if they were ſmitten down by ſome wicked Spirit; ſo that very often, ſome part of the head, or face, is hurt, with the violent fall: And thoſe ſo diſtempered, even like the Dæmonaicks in the Goſpel, are frequently flung into the fire, or the water: but it may be here declared, that the Epilepticks become obnoxious to theſe kinde of evills, for that the fit coming upon them, all knowledge or providence is taken from them; and further, the nerves neighbouring to the head, being ſtrongly contracted, the whole bulk of the Body is carried away headlong: but in the Syncope, and Apoplexie, the fall of the diſtemperd Body, ſeems as the ruines of a building, which happens, by reaſon that its props are taken away: but indeed in the falling Sickneſſe, it is no otherwiſe than if a houſe were overthrown, by the blowing up of Gunpowder, which is removed much from the place where it ſtood.

From whence the Foam at the mouth of theſe troubled with the falling ſickneſs comes.

2*ly.* It is commonly eſteemed a great pathognomick, or peculiar Symtom of the Epilepſie, if when the diſeaſed being fallen to the earth, and ſuffering moſt horrid Convulſions, there flows from the mouth, a ſpumous Spittle or foam, which indeed is thought to be preſſed from the Brain, being ſtrongly contracted, into the palate: But in truth, though it be granted, that this flux of ſpume be very often a ſigne of the falling Sickneſſe, yet it is not ſo appropriated to this diſeaſe, but that the ſame ſometimes happens in the Apoplexie, in deep ſleep, in hyſterical diſtempers, and other convulſive diſeaſes: Beſides, this kinde of Foam, does not deſcend from the Brain, for there is no paſſage open, by which it may paſs, but from the Lungs being inflated, and elevated even to the Larinx, or the top of the ſharp arterie, from whence ſpittle foams forth, with a certain fervency and ebullition: For the fit of the falling evill growing urgent, when moſt of the nerves in the whole Body are drawn together, thoſe alſo that ſerve for the motions of the Lungs, and Diaphragma, ſuffer moſt cruel convulſions, and lifting up all the præcordia upwards, continue them almoſt immovable, in a long Syſtole, ſo that the breathing, and pulſe, cannot be at all perceived: In the mean time, becauſe the blood ſtraitned within the boſom of the heart, diſtends it, and alſo almoſt choakes it, the Lungs however hindred, that they cannot be moved after their wonted and natural manner, perform what they can, with a thick and haſty agitation, whereby the blood may be drawn forth from the Heart; by which endeavour of theirs, the ſhaking aire, by the frequent or thick reſpiration, raiſes the viſcous or clammy humidity into froth, like the ſhaking of the white of an egg; by and by it lifts it upwards towards the Cavity of the mouth,

and ſo at laſt drives it out of doors: wherefore, a foam or ſpumous ſpittle does often ſucceed in other diſtempers, where the pneumonic or breathing nerves are either contracted, or are hindred from performing their Function.

Why ſome in the Falling knock their Breaſts.

3*ly*. Moreover, from the ſame reaſon it comes to paſſe, that ſome *E*pilepticks being fallen to the ground, beat moſt greviouſly their Breaſts with their Hands, and are hardly to be held from it: for when the Præcordia, being troubled with the Spaſm, and hindred that they cannot move themſelves, after their wonted manner, and the blood ſtagnating in them, not without a great oppreſſion of the heart, threatens a ſuffocation of Life; then it is that the ſick ſtrikes their Breaſt, to wit, that the præcordia ſo ſhaken, and as it were moved up and down, might renew their motions, and ſo the blood might be relieved from its ſtagnation, and the heart from its heavy oppreſſion: and this is done after the ſame manner, as when ſome that are ſleeping being tickled, or bit by a flea, unknown to themſelves, preſently rub, or ſcratch the affected place.

The prognoſtication of the Diſeaſe.

As to the Prognoſtication of the diſeaſe, we have already declared, that it is of very difficult Cure, which difficultly conſiſts in this, that the middle of the Brain (in which is the chief ſpring and fountain of the animal Spirits) is very much debilitated, not only by the morbifick cauſe, but alſo by its effects, to wit, the ſeveral fits; and its pores looſened, ſo that they ly open for the entrance of every heterogeneous matter: and ſo the morbid diſpoſition it ſelf being confirmed, by the repeated Paroxiſms, and taking deeper root, it is hardly taken away. But it is to be obſerv'd, that the Epilepſie ſometimes terminates of it ſelf, and is ſometimes overcome by the help of medicines: which happens about the age of puberty, and then only, ſo that, who are not cured, that time being elapſed, that is before the twenty fifth year of age, they ſcarce ever after recover their health, for about the time of ripe age, there is a twofold alteration of the humane *B*ody, and therefore, there often happens a Solution or looſing of the falling ſickneſſe, or of any other diſeaſe deeply rooted: For firſt, at that time, the genital humour begins to be heaped together in the ſpermatick Veſſells, from whence it follows, that the Spiritious particles, and what are wont to grow to them, nitro-ſulphureous and morbifick particles, are layd up, not only in the brain, but alſo in the teſticles: wherefore, if this heterogenious Copula of the Spirits, be more plentifully caryed to that new ſtorehouſe, from thence, the brain becoming free, often leaves the epileptical or otherways morbid diſpoſition. 2. About the time of ripe age, as the Blood pours forth ſomething before deſtinated for the brain, through the Spermatic Arteries, to the genitals, ſo alſo it receives as a recompenſe, a certain ferment from thoſe parts, through the veins: to wit, certain particles imbued with a ſeminal tincture, are caryed back into the bloody maſs, which makes it vigorous, and inſpire into it a new and lively virtue, wherefore at that time, the gifts both of the *B*ody and minde, chiefly ſhew themſelves; Hairs break out, the voyce becomes greater, the courſes of women flow, and other accidents happen, whereby it is plain, that both the blood and nervous Juce, are impregnated with a certain freſh ferment: wherefore, the morbific ferments or ſeeds, unleſſe they be overcome by this new natural firment, they afterwards continue untameable even to Death.

But that the Epilepſie is ſometimes cured by the help of medicines, Experience doth teſtifie: we ſhall anon diſcourſe of the method of healing, and ſhew the reaſons of the moſt famous medicines; in the mean time, as to what further belongs to the prognoſtication of this Diſeaſe, if it end not about the time of ripe age, neither can be driven away by the uſe of medicines, there happens yet a diverſe event in ſeveral ſick Patients, for it either ends immediatly in Death, or is changed into ſome other Diſeaſe, to wit, the Palſie, ſtupiditie, or melancholly, for the moſt part incureable.

The Epilepſie is changed into other Diſeaſes.

As to the former, whenas the fits are often repeated, and every time grow more cruell, the animal function is quickly debilitated; and from thence, by the taint, by degrees brought on the Spirits, and the Nerves ſerving the Præcordia, the vital function is by little and little enervated, till at length, the whole body languiſhing, and the pulſe being looſned, and at length ceaſing, at laſt the vital flame is extinguiſhed.

But that this Diſeaſe often ends in the Palſie, melancholly, or madneſſe, the reaſon is, becauſe the tone, and confirmation of the brain is depraved, by the often

ten exploſions of the animal Spirits, and at length its natural ſtate is ſo perverted, that, by the morbifick particles of another *K*inde alſo admitted, the ſpirits are fixed, nor are any more exactly prone to exploſions, but rather ſometimes, by a contrary vice introduced, their Elaſtick virtue is too much wanting, ſo that they become dull and ſluggiſh beyond meaſure; even, as oftentimes the intemperature of the blood, being more cold than it ſhould be, admits the more intenſe burning of a feavour: and indeed, theſe depreſſions of the ſpirits happens partly by their own proper fault; for that their more agill particles being too much exploſed, the more dull or heavy are only left, and from them they are ſupplyed, but partly, as we have ſaid, they happen from the fault of the brain; for that its pores and paſſages, are ſo dilated and opened, from the often paroxiſms of this falling evill, that afterwards, there is an open paſſage made, for any heterogeneous, and divers kindes of morbifick particles, to enter with the Nervous juce.

Thus much for the Diagnoſis and Prognoſis, the deſcription and judgment of the Epilepſie, or falling ſickneſſe; in the unfolding of which, it was neceſſary to bring reaſons not altogether abſtruſe, and different from the common Pathologie, neither are we conſtrained to receade, in the Therapeatick or Curatory part of this Diſeaſe, from the common and uſuall method of curing, in other Diſtempers: But in truth, the preſcriptions of ſuch who follow the ordinarily received Opinions, by which, for the moſt part, they endeavour to carry away, and wholly to eradicate the morbific matter, by Catharticks only, do little or nothing avail in the falling ſickneſs, yea they are wont frequently to be hurtfull to it. I have known ſome famous Practitioners, omitting wholly the ſeries of the Curatory intentions, betake themſelves to certain Empirical Remedies, without any foreſight of the whole: this kind of practiſe, tho ſometimes it ſucceeds happily, would much more certainly perform the propoſed cure, if the Body being rightly prepared, they ſhould in like manner take away all Impediments, by other medicines.

Of the Curatory part of the Epilepſie.

Wherefore, the Indications concerning the Cure of the Falling Sickneſſe, ſhall be (as they are Commonly ſet down) either Curatory, which have reſpect to the Fit, and drive it away either coming on, or when upon them, to ſet it going the ſooner: or prophylactic or preventory, which have reſpect to the Cauſe of the Diſeaſe, which if they can take away, its acceſſions will be inhibited afterwards.

A general evacuation has ſcarce any place in the former Intention, for in the fit neither a Vomit, or Purge, and very rarely the opening a veine, are wont to be adminiſtred; if the amazed Inſenſibility and diſorder continues very long, ſometimes a Clyſter is wont to be uſed, but what that chiefly aimes at is, to fix the too fierce and Volatil animal Spirits, and alſo to ſuppreſs their begun Exploſions: For which ends, two kinde of Remedies chiefly are made uſe of, to wit, Firſt, ſuch as repreſs the animal ſpirits, being too apt to grow firce and to leap forth, and repell them with ſome perfume that is ingratefull to them, and Compell them into order: which thing indeed medicines imbued with a volatile, or armoniack ſalt, or alſo with a vitriolic ſulphur do effect, of which kinde are ſalt and oyle of Amber, Spirits of Blood, Harts-horn, Sut, tincture of Caſtor, and ſuch like: for theſe being inwardly taken, or put to the noſe, often times bring help, and the evill Spirits of this Diſeaſe, are thought to be driven away, even as in *Tobit*, the Devill was by the fume of the gall of a fiſh. Secondly, the animal ſpirits are call'd away, or hindred from their begun exploſions, when they are allured, or held buſied in ſome work, they are accuſtomed to: wherefore, the fit urging, frictions being uſed and for ſome time continued, thorow the whole body, do often help: *B*ut ſome that ſet upright the diſeaſed, and altogether hold or reſtrain their Arms and legs, from their *C*onvulſive motion, or hold them violently in this or that poſture; that alſo blow things into their noſes to make them ſneeſe, and power down ſtrong Cordials at the mouth, and apply either Cupping glaſſes, and Scarrifications, and handle more ſharply with other manner of adminiſtrations thoſe ſick people, and diſturb the manner of the fit, I ſay this kinde of practiſe is moſt often too roughly inſtituted or ordained: becauſe after this manner, there is a double trouble put upon nature, to wit, one from the diſeaſe, and the other not lighter from the ſtanders by, and helpers, when it were wuch better, for the Fit

to be suffer'd to pass over after its own manner, and the sick to endure but one trouble only.

Truly the chiefest care of a Physitian, and efficacy of medicines is used about the prevention of this Disease, that the cause being taken away, or its root cut off, all the fruits might wither; medicines requisit to this Indication, respect many Intentions, which may yet be reduced, to those two chief heads: to wit, in the first place, that the enkindling or matter of the disease, being supplyed immediately from the vicious Blood, or nervous Juice, and mediately from the viscera, and first passages, be cut off; then in the second place, that the evill disposition of the Brain, and the spirits its Inhabitants, which is peculiar to the Epilepsie, be taken away.

As to the first Indication, here Vomits, purges, and other things, both evacuating, and altering, yea phlebotomy, and Cauteries, have place; for as much as by these means and ways, the impurites both of the viscera, and humours are subdued or brought away; and their dyscrasie or evill disposition amended: for although these kinde of medicines, and medicall administrations, rarely or never cure the Epilepsie, by themselves, yet those take away impediments, set nature upright, and incite her to encounter her enemy; also, they prepare the way, that so specific Remedies might more certainly, and efficaciously shew their virtues; wherefore usually, whilst they take care to cure this disease, with secrets and hidden mysteries, they make use of those kinde of medicines between whiles, in the spring, and autumn, and other fit times.

2*ly.* As to specific Remedies, which indeed only, though not allways, are able to reach the Epilepsie and to subdue it; of which sort are the male Pæonie, Missletow, Rew, Castor, the Claws of an Elk, preparations of a dead mans Skull, Amber, Corrall, with many others. Forasmuch as these are taken without any sensible evacuation, or also perturbation, following in the viscera or humours, it is a wonder, by what formal reason, or virtue of acting, they are wont at any time to help in this disease.

In what the Virtue of the Specificks consists in the Epilepsie.

Concerning this matter, intricate and obscure enough, if there may be place for Conjecture, when as we have already asserted, the procatartick Cause of the Epilepsie, to consist in the heterogeneous Copula, joyning or cleaving to the spirits, inhabiting the Brain, and inciting them to præternatural explosions; it follows, that those things which take away, or resist such a cause, must be of that nature, that by strengthening the brain, and binding up its pores, may exclude that Copula, and so fix, and as it were binde the spirits, flowing within the middle or marrow of the Brain, from leaving their Copula, that they shall not be any more apt or prone, to irregular explosions; Perhaps after the same manner, as when gunpowder or aurum fulminans being pounded with sulphure, or sprinkled with spirit of Vitriol loses its thundering virtue. And indeed, these kind of properties, to wit, one or both of them, may be suspected, yea, in a manner detected, in most anti-epileptick Remedies: For truly, Pæony, Missletow, Rue, the Lilly of the vally, with many others, abound in a certain manifest astriction, that 'tis likely, their Particles being taken inwardly, and so dilated to the brain, by the Vehicle of the blood, and nervous Juice, do so binde, and shut up its too loose and open pores, that afterwards, they do not ly open, for the Passage of the morbifick matter: Besides, for that these vapourous Concerts, breath forth as it were an armodiack scent or scattering, therefore they are sayd to purifie the animal spirits, to fix them, and to strengthen them, having put off their heterogeneous Copula: This virtue purifying the spirits, proceeding from an armoniac salt, is more apparent in Remedies, which are taken from the famuly of Mineralls, and Animalls, such are the preparations of the humane Skull, of blood, amber, and coral, as the other more binding, rather exists, in the parts and preparations of Vegitables.

It will not be needfull here, for the curing of the Epilepsie, to propose a compleat method of healing, with exact forms of prescriptions, because there are extant every where among Authors, general precepts, and most choyce *R*emedies, and the Prudent Physitian will easily accomodate, both the Indications, and that plentifull provision of medicinal stuff, to the particular Cases of the sick. But because we have exhibited a quite new Theorie of this Disease, here also ought to be rendred a Curatory method fited for it: which we shall describe by and by more fully,

fully, after we have ſhewn you ſome caſes or Hiſtories, of people ſick of the Epilepſie.

A fair maid, ſprung from parents indifferently healthfull, being her ſelf very well, till about her coming to ripe age, about that time, ſhe began to complain of her head being ill: And firſt of all, ſhe felt neer the fore part of her head, by fits, a Vertigo or giddineſſe, whereby all things ſeemed to run round; and alſo whilſt this Symptom continued, ſhe was wont to talke idlely, and to forget whatever ſhe had but juſt done; Theſe kinde of fits at firſt paſs'd away within a quarter of an hower, and came again only once or twice in a month, in the interval of which ſhe was well enough: Afterwards, the aſſalts being made more grievous, by degrees, they alſo return'd more often, and within half a year, her brain being dayly more weakened, this giddineſſe or turning round, was plainly chang'd into the Epilepſie, that the ſick being ſtruck down to the ground, at every fit, was affected with Inſenſibility, and horrid convulſions, and alſo with foam at the mouth. The Domeſticks obſerv'd, that ſhe allways fell on the ſame ſide, ſo that ſiting neer the fire, if ſhe ſate in the right Corner ſhe would be flung in the midſt of the fire, but if in the left Corner, ſhe fell againſt the wall of the Chimny: once when being left alone in the houſe, ſhe fell upon the burning Coals, and ſo miſerably burnt her face, and forepart of her head, that the skull being made bare of the skin and fleſh, a deep and large eſcar was burnt into it: and afterwards the outer ſhell of it fell off a hands bredth. In the mean time the ſick maid, ſo long as the ulcers contracted by the burning, ran with filthy matter, ſhe was free from the fits, but afterwards, they being healed up, the falling evill returned: This Diſeaſe began firſt to ſhew it ſelf about the time of puberty, for this maid, preſently after the begining of it, had her Courſes, and afterwards they conſtantly obſerved their ſet times, though her diſtemper grew dayly worſe: Various kinds of medicines being adminiſtred to this ſick Creature, availed nothing, becauſe it was the cuſtome and practiſe, of her, and her friends, quickly to change both the Phyſitian, and method of Phyſick, if an happy event did not preſently follow, and to betake themſelves very much to every Empirick, and outlandiſh Mountebanks. 1. *Obſervation.*

That in this Caſe, the Vertigenous Diſtemper, with a ſhort delirium, was the forerunner of the Epilepſie, it plainly argues, the original of this Diſeaſe being planted in the middle of the brain, to depend upon a certain inordination of the Spirits; to wit, thoſe dwelling there, at the begining, begun to admit an heterogeneous Copula; which being more plentifully heaped up, being moved either of its own accord, or occaſionally, while it was ſhaken off, induced, by reaſon of the ſpirits being diſturbed, and not yet very exploſive thoſe former diſtempers; Afterwards, from the ſame cauſe, by degrees growing worſe, the perturbations of the Spirits did raiſe up their manifeſt exploſions, and chang'd the vertigo, and *Delirium*, into the Epilepſie.

But that this maid began to be ſick, about the time of ripe age, it hence evidently follows, as the natural ferment, ſo ſometimes the præternatural, explicates it ſelf, firſt at that time; wherefore, as it happens, that the menſtruous purgations doe then firſt break forth, ſo the ſeeds of the falling ſickneſſe, whether innate or acquired then budded forth a little, and by degrees were ripened into fruit: when the præternatural Ferment firſt appears, ofttimes the natural following, blots it out, hence the Epilepſie of young ones, often ends about the time of puberty or ripe age, but if that *F*irment, or taint of the diſeaſe, comes after the menſtruous flux, or together with it, and ceaſes not preſently, it remains for the moſt part afterwards, during Life, of it ſelf untameable, and not to be overcome by any Remedies.

From this obſervation, that a Cautery accidentally, and by chance being made on this ſick party, freed her from the fits of the Diſeaſe, it may be inferr'd that fontanells or Iſſues, may be profitably adminiſterd, in the Cure of the Epilepſie: for whereſoever an emiſſary is opened, for the conſtant carying away of the ſerous water, both from the blood, and nervous juce, there very many heterogeneous and morbifick particles, flow out with it, that therefore the brain might remain free.

The Daughter of a Brewer of *Oxford*, had been very obnoxious to a *R*heume falling into her eyes, from her Infancy, otherwiſe ſtrong and ſound enough, alſo accuſtomed dayly to hard labour, about the 14*th*. year of her age, ſhe began to be 2. *Obſervation.*

be tormented with Epileptick fits, of which ſhe ſuffered neer the greater changes of the moon, eſpecially then returning: Being asked to endeavour her Cute, I gave her a Vomit of precipitate Solar; and order d it to be renewed three days before every new,and full moon; beſides that ſhe ſhould take at every turne, for four days after the Vomit, twice in a day, a dram of male-Pæonie root in powder, with a draught of black Cherry water. By theſe remedies, the fits ſo long intermitted, that the Diſeaſe ſeem'd to be Cured. Afterwards when they returned again, ſhe was again recovered by the uſe of thoſe medicines: and then the menſtruous flux breaking forth, and obſerving its true periods, ſhe remained for the future, free from that diſeaſe.

The Therapeutic or Curatory Method.

IN the Curing of the Epilepſie, I judg it fit to begin with a Cathartick, and if the ſick can eaſily bear vomiting, firſt let an Emetick be adminiſtred, and for ſeveral months, let it be repeated, four days before the full of the Moon. For Infants, and youths, may be preſcribed wine of Squills, mixed with freſh *Oyle of Sweet Almonds*, or alſo of *Salt of Vitriol*, from half a Scruple, to 1. Scruple: For thoſe of riper years and of a ſtronger Conſtitution may be preſcribed the following forms of Medicines. Take of *Crocus mettalorum*, or of *Mercurius vitæ* gr. iiii. to vi. of *Mercurius Dulcis* grain xvi. ℈ i. let them be bruſed together in a mortar, mix it with the pap of a roſted Apple or of *Conſerve of Burage* ℥ i. make a Bolus; or you may take an Infuſion of *Crocus Mettalorum* or *Mecurius Vitæ* made in Spaniſh wine from ℥ ß. to ℥ i ß. or take of *Emetick Tartar* of *Mynſicht* gr. iv. to vi. who are of a tenderer conſtitution, let them take of the *Salt of Vitriol* ℈ i. to ʒ ß, and half an hour after let them drink ſeverall pints of poſſet drink: then with a feather or finger put down the throat, let vomiting be provoked, iterate it often.

Vomitories.

The day following the vomiting, unleſs any thing ſhall prohibit, let blood be taken out of the Arm, or from the hæmorhod veins with a Leech: then the next day after let a purging medicine be taken, which afterwards may be repeated conſtantly, four days before every new Moon.

Purges.

Take *Reſine of Jalop* ℈ ß. *Mercurius Dulcis* ℈ i. of *Caſtor* gr. iii. of *Conſerve* of the *Flowers of Pæony* ℥ i. make it into a *Bolus*. Take *pill fætida* the greater ℈ ii. of *Hyſterica* what will ſuffice, make thereof v. pills. Take of the ſtrings of *black hellebore* macerated in Vinegar, dry'd,and powder'd ℥ ß. of Ginger ℈ ß. of the *Salt of Wormwood* gr. xii. of the *Oyl of Amber* drops ii. make a powder, let it be given in the pap of an Apple. Take of the powder of *Hermodactils* compound ℥ i. of *humane Scull* prepar'd gr. vi. make a powder, let it be given in a draught of the *decoction of Hyſſop*, or *Sage*.

On thoſe days that they do not purge, eſpecially about the time of the changing of the Moon, let there be adminiſtred Specifick Remedies morning and evening, which are ſaid to cure this Diſeaſe, with a certain innate and ſecret virtue: of theſe there are extant a very great company, and are preſcribed in various forms of Compoſitious.

Specificks.

The moſt ſimple Medicines, which Experience hath found to be very Efficacious, are the *root of the male Pæony*, aud the *ſeeds* of the ſame. Take of the *Root of the Male Pæony* dryed and powder'd ℥ i. to ii. or iii. let it be given twice a day in the following Tincture. Take of the *leave of Meſſletow* of the *Oak* ℥ ii. of the *root of Pæony* ſlic'd ℥ ß. of *Caſtor* ℥ i. let them be put into a cloſe Veſſel with ſimple water of *Betony* or *Pæony*, and white-wine Each ℔ i. of the *Salt of Miſſletow*, of the *Oake* or the *Common Miſſletow* ℥ ii. let them digeſt cloſe in hot ſand for ii. days, let them take ℥ iii. with a doſe of the aforeſaid powder.

Poor people may take of the aforeſaid powder, in a decoction of *Hyſop* or *Caſtor*, made with fair water and white-wine.

At the ſame time, let the *Root of Pæony* be cut into little bits, and being ſtrung upon a thrid, hung about the neck. Alſo let the Roots being fryed in a pan, or boyled tender, be eaten dayly with their meat.

Take of the *Roots* and *Seeds* of the *male Pæony* each ℥ ii. of *Miſſletow* of the *Oake*, of the *hoof of Elk* ʒ i. each let them be ſliced and bruſed,and put into a thin ſilk bag, and hang at the pit of the Stomack.

Among

Among the ſpicificks, this powder is greatly commended by many Authors. *Powders.*
Take of *Caſtor Opoponax*, *Dragons blood*, *Antimony*, and the *ſeed* of *Pæony*, each alike, make a powder, of which may be taken ℈ ß. to ʒ i. every morning, with wine, or ſome proper decoction, or with *black Cherry water*.

Take of a *mans Skull* prepar'd ʒ i. of *Miſſletow of the Oake*, of *Counterfeit Cinaber*, of an *Elks Claw*, each ℈ ß. ſo mingle them. The doſe is ℈ ß. to ℈ i.

If the form of powder be diſtaſtful to any one, or if it ſhould become loathſome by the long uſe of it, *Electuaries*, *Pills*, *Troches*, *Spirits*, and *Elixirs*, each of which agree with ſpecifick medicines, are wont to be preſcribed.

Take of the *Conſerve* of the *male Pæony*, of the *Lilly* of the *Valley*, each ℈ iii. of *Electuaries.*
the *ſeed* and *root* of the *male Pæony* powder'd each ʒ ii. prepared *Corall* ʒ i. of the powder of *Pearls*, and of *humane Skull* prepared, each ℈ ii. of the *ſalt* of *Miſſletow*, of the *Oake* ʒ i ß. with what will ſuffice of the *Syrop* of *Corall*, make an *Electuary*, let them take of it morning and evening, the quantity of a Nutmeg.

Take of the powder of the *root* of the *male Pæony* ℈ i. of the *ſeeds* of the ſame ℈ ß. of *Miſſletow* of the *Oake*. of an *Elks claw*, of *humane Skull*, prepared, each ʒ ii. of the *roots* of *Angelica*, *Contrayerva*, *Verginian Snakeweed*, each ʒ i. of the whiteſt *Amber*, of *Calcined Corall* each ʒ i. of the *Common Salt of Miſſletow*, ʒ ii. of *Sugar Candy* ℈ viii. diſſolved in what will ſuffice, of the *Antiepilepticall water of Langius*. Make a Confection, of which take twice in a day, the quantity of a Nutmeg.

Theſe powders, by adding to them, the *Salt of Amber*, and *Harts-horn*, with *Pills.*
what will ſuffice of *Balſome Capivi* may be formed into a *pillulary Maſs*, of which may be taken iii. or iv. pills, in the morning and evening, drinking after them a draught of ſome appropriat Liquor.

Or of thoſe ſorts may be prepared an *Elixir*, of which may be taken viii. drops to x. twice in a day, in a ſpoonful of a proper *Julup*, drinking a little of it after it.

Take of *Hungarian Vitriol* vi. pints, let them be diſtill'd with a glaſs retort in *Elixir.*
hot ſand for 24. hours, then let the ſame retort, being defended or done over with Clay, be put with a large receiver in a reverberating Furnace, that the acid ſpirits may be forced with a moſt ſtrong fire, till they come forth. The whole Liquor being diſtilled, let it be drawn off in hot ſand, in a leſſer glaſs retort, and let there be poured into the *Matrace*, of the *roots of Male-Pæony*, cut into pieces and dryed ℈ iiii. of the *ſeed* of the ſame ℈ i. of *humane Skull* prepared, of *Elks claws*, and *Red Corall* each ℈ ß. *Miſſletow* of the *Oak*, ʒ ii. let it digeſt with a gentle heat for ſeveral days, to the extraction of a tincture, the Liquor being decantated, let it be drawn off in a glaſſe Retort to a third part remaining: being ſtilled forth keep it by it ſelf: to thoſe Remains pour of the rectified Spirit of wine a little quantity, impregnated with the Infuſion of the ſame ingredients, and let it digeſt for ſix days in horſe-dung, the doſe of which is ℈ ß. to ℈ i. The diſtilled Liquor may be given from half a ſpoonful to a whole ſpoonful, for the ſame intentions.

Or let there be prepared an oyl, out of the *Salt of Venus* or *Copper*, according to the deſcription of *Henry Van Heers*, and given as there preſcribed.

Among the ſpecifick Remedies, which (when the former ſhall not be profitable) ought alſo to be tryed, are the *Livers of Frogs*, the *Gall of a Bore*, dryed with Urine, The powder of *Bryony Root*. The powder of a *Cuccow*, of *Crows*; the *runnet* and *lights* of a *Hare*, the *Liver of a Wolf*, *ſtones taken out of Swallows*, the *Liver* of a *Kite*, the Eggs of *Crows*, with many more, to be dayly taken with food or Medicine; a famous Catalogue of which is extant of *Henry Van Brays*, a Phyſitian of *Zutphen*: and from which, preſcripts for poor people, may be taken, eaſie to be prepared, and without great coſt. *Emperical Remedies.*

Whilſt theſe kinde of Remedies are to be taken inwardly, according to the aforeſaid method, ſome outward adminiſtrations being applyed, bring help, and are deſervedly admitted to part of the cures; therefore, allways Iſſues are made in this diſeaſe, in one fit place or other, and alſo more often Veſicatories or Bliſters.

Amulets hung about the neck, or born at the pit of the Stomach, are thought *Amulets.*
to be uſeful: The freſh *Roots of Pæony* cut into little ſquares, and being ſtrung like bracelets, and hung round about the neck, and as ſoon as they are dry, let new be put in their places, and they being reduced to powder, may be taken inwardly: Take of the *roots* and *ſeeds* of *Pæony* each ʒ ii. of an *Elks claw*, and *humane Skull* prepared, each ʒ i. of *Miſſletow* of the *Oak*, ʒ ß. let them be beaten into groſs powder

powder, and sowed in a piece of red silk, and like a little bag let it be hanged about the neck.

An *Amulet* of a *stalk* of the *Elder*, found growing in the *Willow-tree*, is greatly Commended.

Plasters. It agrees with some, to have their heads shaven and a plaster applied to the fore-part. Take of the *root* and *seeds of Pæony*, of *Castor*, *Missletow* of the *Oak*, of *humane-skull* most finely powder'd, each ʒ i. of *betonie* plaster ℥ ii. *Caranna Tacamahacca*, each ʒ ii. *Balsum Capive*, what will suffice, make a mass, and let it be spread upon leather, make a plaister for the suters of the Head.

Let the Temples and Nostrills, be often anointed with *Oyl of Amber*, by it self or mixed with *oyl Capive*.

Sternutories or sneezing-powders. *Sneezing Powders*, and such as purge the head of *Rhume*, are to be used dayly in the Mornings: Take of *white Hellebore* ʒ i. of *Castor*, and *Euphorbium*, each ʒ ß. the *leaves* of *sweet Marjorum*, and *Rue*, each ʒ ii. make a powder; make a decoction of *Sage* or *Hyssop*, with *Mustard* dissolved in it, with which gargle the mouth and throat.

A Glister may be sometimes used, as need shall require.

Sometimes the more solid Medicines are ro be moistned with liquids, or they ought to be drunk after them, for which end, distilled waters should be at hand, *Julups*, *Tinctures*, or *Decoctions*, which are endued with a certain Specific Virtne against this Disease.

Distill'd Water. Take of *Hungarian Vitriol* four pound, of the powder of fresh *hnmane-skull*, four ounces, of the *root of Pæony* sliced, six ounces, let them be bruised together in a morter, put to them either of *Spanish wine*, or small *white-wine*, or *wine* made of the juce of *black-Cherries*, a quart; being fermented in a vessell, let it be distill'd in a glass retort, in hot sand.

Take of the shavings of *box-wood*, of *Hungarian vitriol*, each two pound, of the *Missletow* of the *Oak*, or the *Common-Missletow* leaves, three handfuls, of *Rue* two handfulls, being bruised together, put to it of *Spanish wine* 4 pints: Let them be distill'd in a glass Cucurbit with hot sand.

Iulaps. Take of *Common Vitriol* six pound, of the *root* of the *male-pæony* six ounces, of the *Missletow* of the *Oak* one ounce, of *Green-walnuts*, viii. ounces, beiug cut and bruised; let them be distilled in a glass-pot, a *glass alembick* being placed upon it, in hot sand. Take of this Liquor one pint, of *black cherry water*, and of the *water* of the *flowers* of the *toil*, or *Line-tree*, each half a pint, of *white-Sugar*, ℥ iiii. mix them, and make a *Julup*, the dose ℥ ii. to iii. twice or thrice in a day.

Oxymel of *squills*, also an *hony-decoction* with *Hyssop*, are much praised by the Ancients. Or an *Apozem* of this kinde may be prepared, of which may be taken ℥ iiii. to vi. or viii. twice in a day.

Apozems. Take of the *roots* of *male-pæony*, *Angellica*, *Imperatoria*, *Valerian*, each ʒ vi. of the *leaves of Betony*, *Sage*, *Lilly* of the *Valley*, *Penny-Royall*, each one handfull, of the *seeds of Rue*, *Nigella*, each ʒ iii. *Pæony*, ℥ ß. of *Raysons*, ℥ iii. of *Liquoris* ℥ ß. being cut and bruised, let them be boyled in vi. pints of *Spring-water*, to the Consumption of the third part. Towards the end, add of *black Cherry-wine*; half a pint, or ten ounces, strain and keep it in close Vessells. The dose is from vi. to viii. ounces, twice in a day, after the afore-prescribed Remedies.

Or the aforesaid Ingredients, excepting the *Liquoris*, and *Raysons*, may be boyled in vi. pints of *Hydromel*, or *water* and *hony*, or *meath*, to the Consumption of the third part: The dose ℥ iiii. to vi.

Great Remedies. If that the aforesaid Method, consisting in the use of *Cathartick*s, and *Specificks*, being for some time tryed, and altogether in vain, you must come to Remedies of another kinde, and chiefly to those called Great, or Notable: In this rank are placed *Diaphoreticks*, *Salivation*, *Bathes*, and *Spaws*.

Alphonsus Ferrius affirms, that he had cured many Epileptical people, with a decoction of simple *Guaicum*, being prescribed twice in a day, and taken, to vi. or viii. ounces, and its second decoction drunk (as in the cure of the *Pox*) instead of ordinary drink. If to such a decoction the *roots of Pæony* and other specificks should be added, perhaps it would be more efficatious. It seems probable, that a *Salivation* strongly excited from *Mercurie*, and afterwards a *sudoriferous* or *Sweating-Diet* following, might certainly cure this Disease. What *Baths*, or *Spaw-waters* are able to do, I have not observ'd, either by my own or others experience.

Perhaps

Perhaps I have made tryall, that our Artificial *Spaws*, sometimes have been available in Curing the Epilepsie, to wit, both those impregnated with *Iron*, and also with *Antimony*, and taken in a great quantity, for many days.

CHAPTER IV.

Of other kinds of Convulsions, and first of the Convulsive Motions of Children.

AFter the Epilepsie, as it were the principal Spasm, in the chief place excited, to wit, within the middle part of the brain, the other Kindes of Convulsions come to be treated of in order. The differences of those, are best taken from a twofold kinde of cause, and the various manners, and accidents of either. We have already shown, that all Spasmodic distempers, do flow, either from the meer irritation of the spirits or from their explosion, by reason of the cleaving of an Elastick *Copula* to them, or jointly from both, together: wherefore, the manifold Ideas of Spasms, may be distinguished, and distributed into certain Classes, as it happens for this, or that cause, or either together, to remain in the various places of the *Encephalon*, or the nervous Appendix. For indeed, the Spasmodic matter, or the explosive Copula of the Spirits, finding a passage chiefly, and most often thorow the Brain, and sometimes in some measure thorow the extremities of the nerves, subsists either about the origine of the nerves, or their middle processes, or their outmost ends, or abounds in their whole passages, as shall be by and by more particularly declared: Further, an irritation stiring up Convulsions by it self, or with a previous remote cause, although it be made every where in the nervous stock, yet it chiefly, and more frequently produces such an effect, about the beginings, middle processes, and foldings, or ends of the Nerves. But the same Kinde of Cause and effects, are after one manner in Infants and children, and another in youths, and those of riper age. Since therefore we have determined, particularly to consider, all the kindes of Convulsions, we will first discourse of the Convulsive motions of Infants, and Children.

Infants, and children, happen so ordinarily, and frequently to be tormented with Spasmodick Distempers, that this is reconed the chief, and almost the only Kinde of Convulsions; for the Symptoms of this kinde, in other more ripe people, are wont to be called by other known Names, and referred to the Epilepsie, hysterick, hypochondriac, Collic passions, or also to the Scurvie: but in children, they are called, as it were by way of Excellency, Convulsions.

As to this we must observe, that children are found to be greatly obnoxious to Convulsions, chiefly about two seasons, to wit, within the first month after they are born, or about their breeding of Teeth: Although it often happens, that the assaults of this Disease, may come also at other times, and from certain other Causes.

In the first place therefore, it very often happens, that children newly born, or at leaster e they are two months old, are afflicted at every turn with Spasms, excited in divers parts; for that inversions of the eyes, distortions of the cheeks, and Lipps, or tremblings, yea Contractions of the Tendons, and frequent jerkings or leapings forth of the members, and sudden shakings of the whole Body, infest them; and that the same effect likewise sometimes afflicts the præcordia, appears plain enough, because whilst the Spasms busie the Limbs, and outward members, also the face becomes now pale, now of a livid, or dead Colour, from the blood stagnating in the heart, and the Lungs being at that time contracted. As therefore, Spasms are wont to infest three Regions of the Body in children, to wit, the parts of the head and face, the outward members and Limbs, and the Præcordia and viscera, we observe now these regions, now those, now, two or all together to be possessed, by the morbific Cause, to wit, as it is fixed, either about the beginings, or ends of the nerves; and when the former of these hap-

pens, as the superior part of the oblong pith, the middle, or the lowest part of the spinal marrow, is touch'd, one, or more parts together, are assaulted by the morbifick Cause.

As to the other Causes of this Distemper, to wit, the procataric and evident, those of the former Kinde, do chiefly consist in two things, first that all the parts of the Head in Infants are very weak, and abound with a viscous humidity; to wit, the Brain less firm, and the tone of the nerves very loose, so that they are not able to bear the more light force of every matter, but the Spirits inhabiting them, are easily incited into irregular motions or Spasms, by the proper liquour, wherewith those parts are watered, if it flows never so little immoderately, or at least more plentifully, than for the measure of so little strength. But in the second place, because it appears by observation, that children, not only, nor all, who are of a more tender Constitution, are found to be prone to this Disease, therefore, this ought to be rather accounted for a reason, of the more remote morbid Cause, that the Blood, and nervous Juce, are originally vicious, in some Infants, by reason of evills coutracted from the womb: For that the sanguineous mass, wanting eventilation for many months past, becomes impure in children newly born; wherefore, broad and Red puttings forth, like the small pocks, shew themselves through the whole skin, in most children, soon after they are born; to which sort of wealks, or efflorescences, if they are hindred, or repressed, oftentimes dangerous exulcerations, about the parts of the mouth follow. Hence we may deservedly suspect, such impurities of the blood, sometimes to be poured forth into the brain, and nervous stock, considering their debility, and for that reason Spasmodic Distempers to arise; to wit, whilst the blood being vitious from the womb, endeavours to purifie it self, it transfers its fæculencies into the head, which were wont to be exterminated by the putting forth the Red-gum, or red spreadings thorow the skin: Wherefore, a water now thin, and Serous, now thick and sticking, and either participating of præternatural Salts and sulphures, is layd up within these or those receſſes, and Cavities of the Brain, Cerebel, and oblong pith, the recremeuts of which, when they begirt the beginings, or ends of this or that nerve, and sometimes many together, affix on the Spirits inhabiting them, heterogeneous particles, and apt for Spasmodic or Convulsive explosions. For as soon as the nerves have deeply imbibed such particles, the spirits being burthened with their Copula, endeavour either of their own accord, or being incited by evident Causes, to thrust, and shake it off; and so they enter into Spasmodic, or Convulsive explosions.

The evident Causes, which bring on Convulsive motions in children prædisposed, are of two Kindes, *viz.* In the first place, whatsoever stir up unwonted efferveſcencies of the blood, whether they be excesses of heat or cold, a too plentifull nourishment, or hotter then should be, the changes of the air, and weather, and chiefly the periodical times of the Moon; for by reason of these, and other the like occasions, the Blood growing more hot than by right it should be, affixes sooner to the Spirits an heterogeneous Copula, even to a fullness, and causes it presently to be struck off, and exploded, by them throughly disturbed. *2ly.* An Irritation, in almost every part of the nervous System, does not seldome bring into Act, a Spasmodic or Convulsive Disposition: wherefore, not only an excess of tangible qualities, outwardly inflicted, but the milk Coagulated in the stomack, choler, or other sharp humours, or also wormes knawing the Intestines, are wont to excite Spasms or Convulsions: Besides, these kinde of evident Causes, as they are stronger, sometimes induce Spasmodick Distempers of themselves, and without a prævious Disposition: even so worms, and perchance sharp humours, cause Convulsive motions to some children, at least to the more tender.

That it might more certainly, and to the sense appear, what kinde of morbific matter might be in Convulsive motions, I have opened the dead bodies of many, which this disease had oppreſt: I have allways in vain sought the cause, within the Viscera, and first passages of Concoction; In the heads of many, a serous water being heaped up, within the Cavity, under the Cerebel, and distending the Membrane which cloaths the oblong pith or marrow, did overflow the beginings of the nerves: in some, no footsteps of this Disease appeared: so that, what sticking to the Spirits did irritate them into explosions, was of so imperceivable a bulk, and its originall so altogether hid, that it could not be found out, by

dy the most perspicatious scrutiny of the sight. Sometime past, in this City, many chilbren of a certain woman dyed of this Disease, at length, the fourth, as the others, dyed within the month; we dissected the Head, and here no serous Colluvies or water did overflow the ventricles, bnt only the substance of the Brain, and its appendix, was moister then ordinary, and looser; what was most worthy of observation was, that in the Cavity, which lyes under the Cerebel, upon the trunk of the oblong pith, we found a remarkable heap of clotter'd, and as it were concreted blood: but in truth it is uncertain, whether this matter, deposited there from the begining, had primarily caused the convulsions; or rather, whether this blood being extravasated, and expressed, by the contraction of the parts, planted round about, was not the effect, and product of the Convulsions, and not the cause of them; for also in Apoplectical people this kinde of Phænomenon ordinarily happens, which yet we shall afterwards shew, to be rather the effect, than the cause of the disease.

Indeed, the heterogeneous Particles, which flow to the blood, from the womb, are wont to be sent away through efflorencies or Cutaneous Pustles in the whole Body, in many children, in others being poured on the head, are the material cause of the Convulsive Distemper, may be inferr'd, besides the reasons before recited, from the remedies chiefly helping: For that in little children obnoxious to this hæreditarie Disease, the Convulsive fits are best prevented, if that an issue be made Presently after they are born, in the nape of the neck, and blood drawn with a Leech from the jugular Veins; for the corruptions of the nervous juce, are brought away by that, and the impure buddings of the blood, are diverted from the head by this: by these ways of Administrations, when before two or three children, of the same Parent, have dyed of Convulsions, soon after they were born, all the rest have been freed from the same evill.

2*ly*. Thus much concerning the Convulsive motions of Children, which are wont to infest them, by reason of an Infection contracted from the womb. If that at this bout they should escape the Disease it self, or at least its deadly strokes, nevertheless, about rhe time of breeding teeth, they would be found at last to be obnoxious, to the same danger: for when the Teeth, especially the greater, are about to cut, oftentimes a feavour is excited, to which not seldom Convulsions are Joyned: and though at this Time, children are grown stronger, and may better bear the fits of the disease, then when new born, yet the convulsive Distemper, now stirred up by no other grievous occasion, becomes very dangerous, and sometimes deadly.

But forasmuch as childern, who fall into feavours, about the time of breeding of Teeth, are not all tormented with Convulsions, it therefore follows, that some disposition to this disease, either innate, or acquired, doth precede; and that the pain caused from the breeding the Teeth, is to be esteemed only the means of a more strong evident Cause, to wit, Children, who being indued either with a Cacochymia, or juce causing ill digestion, or with a more weak constitution of the brain, and nervous stock, have their animal Spirits too much adulterated, or dissipable, are sometimes disposed for the coming of Convulsive distempers: wherefore, when so acute pain, together with a feavor, afflicts, that latent disposition is brought into Act.

If it be here ask'd, for what reason a feavour, and then Convulsive motions following thereupon, come to those Prædisposed, in teething, it may be answer'd, that either effect may be attributed to the pain, as the immediate Cause: We experimentally know by our selves, what the torment is, that follows an irritation about the roots of the Teeth; in truth so great, and so cruell, that a more cruell can scarce be; for that one or two notable shoots, of the 5th pare of nerves, reaches to the roots of each Tooth, which when it ss hauled by the sharp particles of the Blood, or other humours, there layd up, causes a most sharp sense of trouble, or pain, by its Corrugation: But this kinde of Vellication or hauling of this Nerve, happens thus to children breeding teeth, because that the membranes and fibres, are every way distended, by the Teeth, now increasing into a greater bulk, and as yet included within the scarce hollow gums: hence the blood being hindred in its Circulation, causes a tumour, and so presses the nerves, and also pours on them the more sharp particles of the Serum, by which, being notably pulled or hauled, they are tormented with Corrugations, and painfull Spasms.

Therefore, when so cruel pains happen to children, from their breeding Teeth, it is no wonder if a feavour, and also Convulsive motions sometimes follow: the former of these happens, both for as much as the blood being hindred about the pained part, is not circulated with its wonted and equall course, wherefore it becomes inordinatly moved, in the whole Body; and besides, becaus Spasms being stirred up somewhere in the nervous stock, the corrugated and contracted nerves, presse together, and pull the Arteries, and by that reason, stir up irregular and feavourish fluctuations in the Blood. But sometimes Couvulsions happen in breeding Teeth, both becaus the blood growing hot, sends forth heterogeneous particles, to the animal government, and so stirs up the spirits into explosions; and besides also, when this acute pain, and as it were a Lancing, follows upon the teeth being about to cut, it communicates a very troublesom e and irritative sense, from the affected parts, to the first sensorie, presently from thence, the motion of the rage is retorted, by the same or other neighbour nerves, which by reason of a prævious disposition, doth not rarely become convulsive.

Besides these two occasions of Convulsions (which are wont to be chiefly, and more often in children) to wit, the times of Infancy, and breeding Teeth, this Distemper also is excited at other Times very often, and for other Causes: For in whom the Seeds of the Spasmodick Disposition is sown, they sometimes unfold themselves presently after the birth, and are ripened into morbid fruit; or else lying hid for a while, they now come before the breeding of Teeth, and follow a long time after it; and by reason of other evident causes, to wit, either external, or Internal; of which sort are a sickly, or breeding nurse, milk Coagulated in the stomack, or degenerating into an acid or bitter putrifection, a feavourish distemperature of the head, Ulcers or wealks of other parts suddenly vanishing, the Changes of the aire, the Conjunctions, oppositions, and aspects of the Sun, and moon, aud such like; they at length break forth into Act, from an uncertain event. Concerning these, there is no need, that we should particularly discourse.

When all the Children, of a man dwelling in the neighbourhood, dyed of Convulsions, within the space of three months, at length, to prevent that fatal event, they sought for remedies, for a child newly born: I being sent for, a few days after the being brought to bed, first advised the making an Issue in the nape of the neck, then, that the next day after, a leech being applyed to the jugular veine of each side, two ounces of blood should be taken away: besides, that about every conjunction, or opposite aspect of the Sun, and moon, about five grains of the following powder shonld be given, in a spoonfull of Julap, for three days, morning and evening. Take of humane Skull prepared, of the root of the male Pæonie, each ʒ i. of the powder of Pearls ʒ ß. of white sugar ʒ i. mingle them, and make a very fine powder: Take of the waters of Black Cherries ℥ iii. of the antiepileptic of Langius ℥ i. of the Syrrop of the flowers of the male Pæonie ʒ vi. mingle them; also I order'd that the nurse at the same times, should take a draught of whey, or posset drink, in which were boyled, the seeds and roots of the male Pæonie, and the leaves of the Lilly of the Vally, the Infant for about four months was well, but then began to be troubled with Convulsions: at which time, the same Remedies being administred both to the child, and to the nurse, in a larger dose, vesicatories also were applyed behind the eares, and blood was taken by the sucking of a Leech, from the jugular veins: within two or three days the child grew well: afterwards, whenever within four or five months the Convulsions return'd, it was cured again, by the use of the same Remedies. After half a year, the Convulsive motions wholly ceased, but a painfull Tumour arose, about the lower part of the *Spinæ dorsi* or back-bone, from which proceeded a certain distortion of the *Vertebræ*, or joynts of the back bone, and a weakness of the legs, and at length a Palsie. It seems in this case, that the Spasmodic or Convulsive matter, being wont to come upon the brain first, and beginings of the nerves, entring at last the Spinal marrow, and being thrust out at its further end, it wholly stopt up the heads of the appending nerves, and shut out the passage of the Spirits: to wit, becaus other narcotick, and more thick, had joyned themselves, to the explosive particles.

The

The Curatory Method against the Convulsive Distempers in Children.

IT is to be endeavour'd either to prevent the Convulsive passions, threatning Children and Infants, or to cure them being already begun.

The Preservation of Infants from Convulsions.

For if the former children of the same parent, were obnoxious or lyable to Convulsions, that evill ought to be prevented timely, by the use of Remedies to those born after: It is usuall for this end, to put into the mouth of the child newly born, some antispasmodick Remedy, assoon as it begins to breath: from hence some are wont to give them some drops of the purest hony, others a Spoonfull of Canary sweetned with Sugar, and some again oyl of Sweet Almonds fresh drawn, to some may be given half a Spoonfull of epileptic water, or one drop of oyle of Amber.

Besides these first things given to Infants, which certainly seem to be of some moment, certain other Remedies and means of Administrations, ought to be used: to wit, let one spoonfull of Liquor, proper to this distemper, be drunk twice a day: as for example; Take of the water of black Cherry and of Rue each ℥ i ß. of the Antiepileptic of Langius ℥ i. of the Syrrup of Corall ʒ vi. of prepared Pearl *gr.* xv. mix them in a Viol. On the third or fourth day after the birth, let an Issue be made in the nape of the neck, then if it be of a fresh Countenance, let a little blood to about ℥ i ß. or ii. ounces be taken, by the sucking of Leeches, from the jugular veins, having a care lest the blood should flow out too plentifully in its sleep; let the temples, and the hinder part of the neck, be gently rub'd with such a like oyntment. Take of oyle of nutmegs by expression ʒ ii. of Capive ʒiii. of Amber ℈ i. Let an Amulet be hung about the neck, of the roots and seeds of the greater Pæonie, a little of the hoof of an Elke being added to it.

The Method of Curing to be used to the Nurses.

Moreover antispasmodick Remedies, should be dayly given to the Nurse: Let her take morning and evening, a draught of whey or posset-drink, in which the roots and seeds of the male Pæonie, and sweet fenill seeds are boyled. Take of the Conserve of the flowers of Betony, of the male Pæonie, and of Rosemary each ℥ ii. of the pouder of the Root, and flowers of the male Pæonie, each ʒ ii. of red Corall prepared, and of the whitest amber each ʒ i. of the roots of Angelica, and Zedoarie prepared, each ʒ ß. with what will suffice of the Syrrop of Pæonie, make an Electuarie: let her take morning and evening, the quantity of a Nutmeg.

Take of the powder of the *root* of *Male-Pæony* ʒ ii. the *seeds* of the same ʒ i. make a powder; of the whitest Sugar ℥ iii. dissolved in the water of the *flowers* of the *Line-tree*, and boyled to tablets, of the *oyl of Amber* ℈ i. make tablets according to Art, each weighing ʒ ß. let her eat one every sixth hour. Also let her keep to an exact dyet.

The Cure of Infants sick with Convulsions.

If any Infant be actually afflicted with Convulsions, because that an Issue operates little, and slowly, it will be expedient to apply blistering plaisters, to the nape of the neck, and behind the ears, and unless a more cold temperament should gain-say it, let blood be drawn with Leeches, from the veins: Let Liniments be used about the Temples, Nostrills, and hinder part of the neck, and plaisters also laid to the bottoms of the feet; Clysters that may keep down the belly, should be dayly administred: besides let specifick Remedies be inwardly taken, often in a day, to wit, every sixth or eighth hour.

Oyntments.

Take of the *oyl Capive*, of *Castor* each ʒ ii. of *Amber* ʒ ß. make a Liniment.

Take of the plaister of *Oxycrocia* two parts, of dissolv'd *Galbanum* one part, of *oyl of Amber* ℈ i. make a plaister for the soles of the feet. Let there be given of the powder of *Ammoniacum*, according to the description of *Reverius*, twice or four times in a day.

Powders.

Take of *humane skull* prepared, of the *seeds* of *Pæony*, of an *Elks claw*, of *Pearls* prepared, each ʒ ß. of *Amber greese*, gr. vi. make a powder; the dose vi. grains, in a spoonfull the Liquor hereafter described, three or four times a day.

Or Take of *humane Skull* prepared, of pearls each ʒß. of the *Salt of Amber* ℈ i. of the *Sugar of Pearle* ʒ i. the dose ℈ß.

Or Take of the *Spirit of harts-horn* iii. drops, let it be given every sixth or 8*th* hour, in a spoonfull of the Julap below prescribed.

To

To the children of the poor, may be administred the *powder* of the *Roots* of *wild Valerian* ℈ß. to ℈ i. let it be given twice a day, in a spoonfull of milk, or appropriate Liquor.

Untzerus greatly commends the Gall of a sucking whelp, to wit, that the whole juice of the gallie-Bag being taken forth, be given to the child to drink, with a little of the water of the *flowers* of the *Tile*, or *Line-tree*.

A learned Physitian lately told me, that he had Known many Cured with this Remedie: Besides, Empericks are wont to cause the bigger children, after they have drank the gall, to eat also the Liver of the whelp broyled.

Liquors. Iulaps, distill'd waters, and other appropriate Liquors, may be prepared, after the following prescripts.

Take of *black-Cherry water*, ℥ iii. of the *Antiepileptical* water of *Langius*, ℥ i. of perlate sugar, ʒ ii. mix them.

Take of the green *Roots* of the *male Pæonie* cut into little peeces ℥ vi. of *Hungarian Vitriol* ℥ viii. of *humane skull* ℥ ii, of the *Antiepileptic water* of *Langius* half a pint, mix them, and let them be distilled in a glass retort, in hot sand, the dose i. spoonfull, to ii.

Take of the fresh roots of the *male Pæonie* cut, ℥ iiii. being brused in a Marble morter, pour to them of Spanish-wine, *lib.* i. make a strong expression, add of *manus Christi* pearled, ℥ß. let it be kept in a close glass. The dose i. Spoonfull, or ii. twice in a day.

Convulsions by reason of breeding of Teeth. When Convulsive motions happen by Reason of the difficulty of breeding Teeth, this Symptom as it is secondary and less dangerous, so the Cure, does not always require the first or chief labour of healing, but sometimes we are rather carefull to remove it, by allaying the pain, and the feavourish Distemper, wherefore both the patient, and the nurse, oughr to use a slender, and refrigerating Diet; the Teeth being about to break thorow the Gums, their passage should be made easie, by rubbing or cutting them; and also *Anodynes* should be applied to those swelled, and grieved parts: Clysters and taking away blood are often used: it behoves to cause sleep, and to attemper the feircenefs of the blood: some times antispasmodick Remedies are made use of, but the more temperate, and such as do not trouble the blood, and humors, Vesicatories, or Blistering plaisters, because they aptly evacuate the *serum*, too much poured forth on the Head, oftentimes bring help.

Spasms or Convulsions caused from other occasions. When Children are troubled with Convulsions, not presently after they are born, nor by reason of the cutting of their Teeth, but for other occasions, and accidents; the cause of such a Distemper, for the most part subsists, either in the head, or somewhere about the Viscera of Concoction. When the former is suspected, as it is wont to be manifested by signes which argue a *Serous Colluvies*, too much heaped up within the Head, the former Remedies, allready recited, ought to be given, in a larger dose; besides, in those, who are able to bear purging, sometimes a Vomit, or a light purge is prescribed: *Wine*, and *Oxymel* of *squills*, also *Mercurius Dulcis*, *Rhubarb*, and *Resin* of *Jalap*, are of approved use.

As often as the Cause of the Convulsive Distemper seems to be in the *Viscera*, either Worms, or sharp humors, stirring up the torments of the Belly, are understood to be in fault.

By reason of worms. Against Worms, a purge of *Rhubarb*, or *Mercurius Dulcis*, the *Resin* of *Jalap* being added, is ordained: sometime past, a Child being miserably afflicted with Convulsious, that he seem'd to be just dying, I gave him a dose of *Mercurius Dulcis*, with *Resine* of *Jallap*; with his stools, which were four, he voided xii. worms, and presently grew well.

Take of the *root* of *Verginian Snake-weed*, in powder ʒ i. of *Corall Calcined* to a *whiteness* ʒ ß. a powder ʒ i. the dose from half a *scruple*, to one *scruple*, twice in a day, continued for three days, drinking after it a decoction of *Grass-roots*. Take of the species of *Hiera* ʒ i ß. of *Venice-Treacle* ʒ ii. make a plaister for the bottom of the belly, or apply to the Navel, a plaster of *Galbanum*.

If the Convulsive motions are suspected to proceed from an irritation of the ventricle, and intestines, made by sharp humours, a gentle purging, either by vomit, or stool, or both successively ought to be instituted. For this end, let them drink, a gentle Emetick, of wine of squills, or salt of vitriol; when even the sick are troubled with a striving to Vomit of their own accord: but if the other Evacuation,

cuation, or down-wards shall seem better to be tryed, they ought to take an Infusion of *Rhubarb*, or the powder, and *Syrrop* of *succory* with *Rhubarb*, or of *Roses* with *agaric* and very often by these Remedies, timely applyed, I have seen the Convulsive Distempers in Children to be cured: besides in this Case, Clysters are frequently used: but external Medicines are not to be omitted; to wit, fomentations, oyntments, plaisters applyed to the Belly.

Take of the *flowers* of *Cammomel* cut very small, ii. handfulls, let them be put into two little bags, made of fine Linnen, or Silk, which being dipped in warm Milk, and wrung out may be applyed successively to the abdomen, or lower region of the belly.

Take of the tops or flowers of *Mallows*, in like manner but small, let them be fryed in fresh butter, or hogs Lard, and in the form of a Liniment, or a Cataplasm, applyed to the Belly.

CHAPTER V.

Of Convulsive Diseases, of Ripe Age, arising chiefly by reason of the Nervous origine being affected.

ALthough Convulsive Distempers, which happen to those of riper years, being known by other Names, also are commonly reputed of some other stock, and are wont to be referr'd to the passions called Hysterical, Hypochondriacal, or Colical, or to the Scorbute; yet if the matter be a little better consider'd, it will easily appear, that some Convulsive Symptoms, both in Men and Women, do come from the Brain, which Convulsions properly and truly challenge to themselves the Name: But these (as we have already mentioned) may be distinguished after a various manner, by the manifold seat of the morbifick Cause, but chiefly into these three kinds, *viz.* Into Spasms or Convulsions stirred up, by reason of the origine of the Nerves being chiefly affected; into others being stirred np, by reason of the extremities or ends of the Nerves, being possessed by the morbifick matter; and lastly into such, from whose head the morbific matter descending, fills the whole passages, or the most part, of some certain Nerves, or of all together.

Three kinds of Convulsions happning to those of riper years.

Therefore, that we may proceed, to unfold the Convulsions, arising from the beginnings of the Nerves being affected, take notice here, that the morbifick matter beseiging the beginnings of the Nerves, doth sometimes chiefly flow into the first pair of Nerves, to wit, which respect the Muscles of the eyes and face, and from thence the contractions, aud tremblings, now of the Nose, Cheeks, or Lips, now of the Eyes, or the distortions of the mouth, follow. Secondly, sometimes the wandring and intercostal pair do chiefly imbibe the Heterogeneous particles; and then Inflations, or Contractions of the Abdomen, and Hypochondria, and also the palpitation of the Heart, trembling, difficult and interrupted breathing, an intermitting pulse, and other Symptoms of the middle, and lower Belly, do very much infest. Thirdly, but sometimes the morbifick Cause being placed lower, affects chiefly the spinal marrow, and therefore the outward members, and limbs, are rendred obnoxious to inordinate leapings forth, and contractions: Further, in very many Cases of this nature, because the Animal spirits being explosed about the origine of the Nerves, do inordinately leap back towards the *Encephalon*; for that reason, to all Convulsions almost being excited by this means, the *Vertigo*, also the scotomie or giddiness, the tingling of the eares, and sometimes the amased Insensibility or falling down of the Spirits, are joyned, or follow.

Distempers arising from the Nervous origine distinguished.

1 According to the various Nerves being affected.

But as we may Conjecture, from the various figures of the Convulsive distemper, it seems, that the Convulsive matter hauling those, or these nerves, or many of them together, is lodged either about their beginings, only, so that the Spirits in that place being often explosed, a frequent and very troublesome Vertigo arises, besides tremblings, and a short faintness about the Præcordia, swoonings, and often leapings, and light contractions in the Viscera, or muscles are felt. Or Secondly, the explosive particles being dilated to the beginings of the nerves, enter

2. According to the Various places of the same Nerves being affected.

ter more deeply into their processes, and not seldom being slidden down into the nervous foldings, belonging to the Præcordia, or the Viscera of the lower belly, or also to the exterior members, procure there, other as it were nests of Convulsive distempers, that as often as the Spirits about the nervous origine, are driven into explosions, presently, fits as it were hysterical, asthmatical, or otherways Convulsive, arise in the Abdomen, Thorax, or Limbs: Examples of these, and by what means they are made, shall be anon more clearly delivered: In the mean time, the spasmodic matter, flowing into the pipes of the Nerves, when it is transfer'd even to their processes and remote enfoldings, yet, forasmuch as it hath still its chief mine about the nervous original, therefore after very grievous Convulsions of the Viscera or members, a great perturbation of the Brain follows thereupon, with a tingling of the eares, a vertigo, and often an Insensibility or amased excurtion of Spirits: but sometimes the morbific matter, as to the greatest part, being translated to the fartheſt ends of the nerves, from thence they become free or clear about their beginings: For I have observed many, who, whilst at the begining, they were infested with the vertigo, often fainting away with fear, head-ach, and heavyness about the hinder part of the head, to have felt about the *Præcordia* or *viscera*, only light inflations, or tremblings; but afterwards, suffering more cruel Convulsions about these parts, they did not complain of the former distempers of the Head.

By what means the convulsive matter flows into the Nerves.

If it should be further demanded, concerning the Convulsive matter, from what place it should be brought, and by what ways carried towards the beginings of the Nerves, and what kinde of Settlement, and as it were cherishing nests it there obtains; we say, that although we cannot detect the footsteps, and manifest passages of this matter, yet so much may be collected from certain observations, and the analogie of things, it may be supposed there are these two distinct manner of passages, whereby the Convulsive particles, being first poured out into the Brain and Cerebel, from the blood, are from thence carried towards the beginings of the Nerves: *viz.* First sometimes this matter being imbibed by the Brain and Cerebel, and by degrees passing thorow, the pores of either, slides into the Trunk of the oblong marrow, whose tract being also overcome by it, together with the nervous juice, it slides forward towards the original of the Nerves, and is heaped up neer their heads, or within the medullarie trunk it self, or within the annularie Prominencies, in which places, either a long while subsisting, it stirs up frequent *Vertigoes*, and more light Convulsions, in remote parts as hath been said; or being slidden from thence, more deeply into the passages of the nerves, excites fits of Convulsions very Cruel: such a progress of the morbific Cause, we suspect in whom the Vertigo, swooning, heavines of the head, and torpor of the minde, go before the Convulsive assalts: Indeed, the matter of the disease, abounding as yet in the brain and marrowy Appendix, produces these kinds of previous distempers; which being slidden from thence, into the Nerves, causes Convulsions.

2*dly*, There is yet another way, whereby it plainly appears, that the materiall cause of the Convulsive Distemper, is transferred, to the beginnings of the Nerves; to wit, when the same being deposited by the *serous water* within the Cavities, or ventricles of the Head, it is insinuated into the Neighbouring roots of the Nerves: For in *Chronical* Diseases, when the remarkable discrasie of the blood and humours, happens also to be accompanied with a praved disposition of the brain, oftentimes a great plenty of sharp *serum*, infesting the Nervous stock, dropping forth from the Vessells of the *Choroeidan*, or retiform enfoldings, slides into the ventricles of the brain, and its Appendix: But this serous water, afterwards breaking thorow the under-spreading of the *Cerebell*, into the fourth ventricle, the little skin there being displaced, whereby the oblong marrow is uncovered, it falls upon the beginnings of one or more of the Nerves, and either by irritating, or imbuing them, with Heterogeneous and explosive particles, induces the Convulsive disposition. And this for the most part is the cause, that sick people, after long and ill handled Feavours, also after the more grievous *Cephalic* Diseases, at length dye of Convulsions; as I have found, by the frequent Anatomie of the Carcases, of those who dyed by that means. Also it appears by anatomical Observation, that the brain may be overflowed by a certain serous water, without the distemper of the Convulsive disposition; and further that in some,

who

who dyed of the Epilepſie, and other Convulſive diſeaſes, there was no deluge of the *ſerum*, within the ventricles of the brain: By which it is given us to be underſtood, that the Convulſive diſtempers, do not flow only from the waterie matter in the Head; but that they ariſe not at all from ſuch a cauſe, unleſs the *ſerous* water, overflowing the *ventricles* of the Brain, and chiefly that underlaying of the *Cerebel*, be imbued with heterogeneous and exploſive particles. I remember once, my Councel to be ask'd for a young man labouring with an Egregious Phtiſis, and at that time truly deſperate, beſides a cough, and ſhortneſſe of Breath, he had grievouſly complained for many days, yea weeks, that he could not lye upon his back in his Bed, or whilſt he ſat in a chair, he could not lean his head backwards: for that by this, or that poſture of his Body, he was wont preſently to ſuffer tremblings of his heart, and a fainting of the Spirits, as if he were juſt about to dye: wherefore of neceſſity he was fain to hold his head upright, or leaning forward. After he was dead, his carcaſe being diſſected, his Lungs appeared all over tumified, and in ſome places Ulcerated: then his Skull being opened, there flowed within all the *Ventricles* of the brain, a great quantity of yellow and ſalt *Serum*: which water certainly whilſt it did ſlide forward upon the fourth *Ventricle*, about the Trunk of the oblong marrow, his head leaning back, ruſhing upon the heads of the wandring, and intercoſtal pair of nerves, did ſtir up the aforeſaid Convulſions about the *Præcordia*: but ſo long as his head was inclined forward, that the heap of *ſerum* flowed back into the anterior *Ventricles* of the Brain, the origine of the nerves remained free from that Convulſive matter.

Having hitherto ſhown, how many ways, and by what paſſages, the morbific matter, being dilated towards the origine of the Nerves, ſeems to bring on Convulſions, it were eaſie, according to theſe reaſons, to unfold many Convulſive Symptoms: for beſides the Convulſive motions of Infants, and children, oftentimes excited from the ſame kinde of Cauſes, hither may be referr'd the Contractions, and ſudden leapings forth of the nervous parts, which follow upon feavours. As alſo thoſe paſſions commonly called *Hyſterical*, alſo *hypocondriacal*, and certain others, proceed not ſeldom from the *morbific* Cauſe, ruſhing upon the beginings of the Nerves. We will therefore endeavour to eſtabliſh the truth of this *Hypotheſis* by ſome other Hiſtories, and examples, of Sick people; but in the firſt place, we will propoſe obſervations of that *K*inde, in whom the morbific matter, ſetling upon the beginings of the nerves, and not being as yet ſlid deeply into their proceſſes, induced frequent *vertigos*, and only more light Convulſions, of the *Viſcera* and *Præcordia*.

A noble woman about 30. years of Age, of a tender Conſtitution, and lean in Body, was wont every winter to be grievouſly afflicted with a *Catarrh* or Rhume, flowing upon the winde pipe, and Lungs, with a hoarſe Cough, and great ſpitting, but the laſt year, great care and dilligence being uſed, ſhe avoyded that evill. But after the winter Solſtice, having taken cold, ſhe was troubled with an huge pain of the head, a tingling of the ears, a giddineſs, with a great defluxion upon the eyes, that it eaſily appeared, that the heap of *Serum*, which before this time was wont to diſtill into the Breaſt, was now wholly layd up, within the head and Brain: beſides, an effect of which was, that as often as ſhe began to ſleep, ſhe was greatly infeſted with paſſions, as it were *hiſterical*, to which ſhe had never been before obnoxious: For when ever being ſleepy ſhe cloſed her eyes, preſently a bulk aſcending in her belly, a choaking in her throat, tremblings, and leapings about the *Præcordia*, were ſtirred up; which Affections notwithſtanding quite ceaſed, when ſhe was thorowly awakened, ſo that the Sick party was neceſſitated, to abſtain almoſt altogether for many days and nights from ſleep. 1. *Obſervation.*

Being ſent for to this Lady, after ſhe had bin ſick and weak for many days, I was compelled at length to uſe gentle medicines: Therefore I took care, that blood ſhould forthwith be drawn from the foot, to four ounces, and every day a Clyſter of milk and ſugar to be adminiſtred, by which ſhe was wont to have three or four ſtools: beſides I gave her every eighth hour a doſe of the Spirits of *Harts horn* in a Spoonfull of the following Julap. Take of the water of *penny-royall*, of *walnuts*, and *black Cherries* each ℥ iii. of *Hiſterical water*, ℥ ii. of the Syrrop of *Clovegilliflowers* ℥ i ß. of *Caſter* tyed in a little knot, and hang'd in the middle of the glaſs ʒß. of the powder of Pearls ϑ i. mingle it. I Cauſed with ſucceſs, a *veſicatorie* to be put behinde the ears, and a *Cataplaſm*, of the leaves of *Rue* and *Cuccow-*

pint, with the *Roots of Bryony*, *bay salt*, and *black soap*, to be layd to the soals of her feet. Sometimes I gave her in the evening, in a little draught of the prescribed Julap, half an ounce of *Diacodium*, to which succeeded a moderate sleep, without the wonted Convulsions following: which kinde of effects, from opiats exhibited in the like case, I have often experimented: for the quenching her thirst, I gave her a *Ptisan*, with diuretick Ingredients boyled in it: by the use of these, she was very much eased, in a short time. But what provèd a great benefit to her was, that an Imposthnme in her ear, breaking of its own accord, powred forth, at first a yellow matter, and afterwards for many days, a great plenty of thin *Ichor* or *Excrement*, by which Evacuation, the Convulsions of the *Viscera* and *Præcordia* wholly ceasing, the disease was perfectly Cured.

As to the Reason of the aforesaid sickness, without doubt it seems, that those Distempers were excited, by the serous colluvies, layd up within the Bounds of the Head: for the translation of that humour into the head, brought at first both the Disease, and the Secretion or flowing of it out, thorow the Emunctuaries of the ear, took away all the Symptoms: Besides, when the morbific matter had brought in to the Spirits, planted about the beginings of the nerves, a Dispositon somewhat explosive, they, though being struck as it were with madness, they were continually troubled, yet so long as leaping back towards the Brain, they obtained a space, in which they might be more freely expanded or stretched forth, they did indeed only more vehemently exercise the Phantasie, and without farther trouble did only cause watchings. But, when by sleep sometimes Creeping upon her, , the excursion of the unquiet Spirits were restrained towards the Brain, (which indeed necessarily happens, when we sleep, the nervous Liquor within the pores of the brain, at that time being more plentifully admitted) they tumultuarily rushing upon the heads of the wandring pair and intercostall Nerves, troubled the whole *series* of Spirits, flowing within the passages of those Nerves, and so caused the aforesaid Convulsions, about the *Præcordia*, *Viscera*, and muscles of the Throat. I have known many both Men and women sick after this manner, who, when they have been troubled with an headach, an heaviness of the hinder part of the head, or a *Vertigo*, have while they slept, felt forthwith in their *Præcordia*, or *Viscera*, or in both together, perturbations as it were Convulsive; which indeed happens from the bending downward of the tumultuating Spirits, being reflected from the brain, upon the beginings of the Nerves: But that the use of opiats, brought a pleasing sleep to this sick person, without the wonted Convulsions, following, the reason was, because the animal spirits, as unquiet and furious as they were, yet by the Intanglement of the narcotick Particles, they were bound as it were in chains, that afterwards, without any resistance they were overcome by sleep. I have indeed very often happily cured, most grievous fits of Convulsions, both Asthmatical, and as it were hysterical, by administring Opiates.

2. *Observation.* An honest woman M. G. of 67. years of Age, yet of a florid countenance, and fat in body, when she had been a while obnoxious at first to a swelling of the face, and very grievous fits of the headach, she fell through the great cold of the winter, into a very troublesome *Vertigo*, with a trembling of the heart, a fainting away of the Spirits, and a frequent striving to vomit: being lay'd in her bed, if she opened her eyes, or turn'd her from one side to another, she was presently troubled with a notable gididness, or swimming in the head, with swooning, and effectless vomiting. Visiting this woman, I doubted not, but that the cause of her sickness was, the Convulsive matter, being translated from the exterior region of the head, to the most inward recesses of the *Encephalon*, by whose inspiration or heterogeneous *Copula*, the animal spirits being, touched while they leaped forth inordinatly towards the brain, they excited the vertiginous Distemper, and while they rushed tnmultuarily upon the heads of the nerves, the Scotomie, disorder of the *Præcordia*, and endeavouring to vomit. A large Vesicatory or blistering Plaster, being applyed to the nape of the neck, and behind her ears, Clisters dayly administred, also the use of *Spirits of harts-horn* frequently, and of a Cephalick Julap, cured her within a few days.

3. *Observation.* A noted man, about 34. years of Age, when he had been for a long time subject to a Cough, with great aud thick spitting, besides having the pores of his skin very open, he was wout to sweat continually, and every night to be wet with it:

it: about the begining of the ſpring, he perceived thoſe uſuall evacuations to happen more ſparingly; in the mean time, he Complained of a fullneſs of his hands and feet, and as it were a certain ſwelling or puffing up, ſo that he feared a dropſie was coming upon him; beſide he was troubled in his head with a giddineſſe, and frequent *Vertigo*: A little while after, this evill increaſing, light contractions, and ſudden Convulſions, were ordinarily excited, about his Lips, and other parts of the mouth and face; alſo preſently after (the morbific matter as it ſhould ſeem, flowing upon the beginnings of the wandring pair, and intercoſtal nerves) he was afflicted with the trembling, and leaping of the heart, with frequent fainting away of the vital ſpirits, as if a *Leipothymy* or ſwooning was falling upon him.

I know that very many aſcribe theſe Convulſive paſſions, ſo grievouſly infeſting the *Præcordia*, to the vapours riſing from the ſpleen: but it ſeems much more reaſonable, to deduce them from the Convulſive matter layd up within the brain, and ruſhing npon the beginnings of the Nerves; becauſe a ſhifting or tranſlation of ſome excrements, from ſome other parts, to the head goes before, and that it is ſo layd up, within the compaſs or bounds of the *Encephalon*, the almoſt continual vertiginous diſtemper, and the Convulſions of the parts of the mouth, and face, teſtifie it plainly: wherefore *I* thought good to preſcribe to this man, Remedies, according to the method hereafter ſhown.

I might be able here to propoſe many obſervations of this nature, in whom the morbific matter, ſubſiſting neer the beginnings of the nerves, ſtir up light Spaſms or Convulſions, only of the *Viſcera* or members, with a *Vertigo*. But becauſe a portion of this matter, deſcending from the head, enters more deeply the pipes of the Nerves, and ſo ſtrows the tinder or enkindling of exploſive ſeed, as it were gunpowder, about their middle and ultimate proceſſes and enfoldings, it will be to the purpoſe, to add ſome examples of this kinde.

A certain young maid E.L. tall and hanſome, ſprung from ſound parents, and her ſelf (as far as might be Perceived) originally healthfull, after ſhe had ſerv'd a maſter long ſick, being a long time and almoſt continually with him, and was forced to watch whole nights very often, and alſo at other times, ſo that ſhe never ſlept but ſhort and interrupted naps; ſhe at length begun to complain of an heavineſs in her head, and a frequent *Vertigo*: within a little time after, the diſtemper growing worſe, ſhe felt tremblings in her whole body, with a light ſhaking of her members, which came at certain times, though wandring and uncertain: afterwards ſhe ſuffer'd fits plainly Convulſive, and thoſe horrid, and often infeſting: a little before the approach of the diſeaſe, ſhe was afflicted with a ſhort *Scotomie*, or ſwimming in her head, by and by ſhe felt a ſtreightneſs, and great oppreſſion of her Breaſt, whereby all her *Præcordia* were drawn together: then preſently gnaſhing her teeth, and giving a great groan, ſhe was wont to fall to the ground; in the mean time, ſhe was ſenſible, but labouring with the great oppreſſion of her heart, till that conſtriction of her breaſt was looſned, ſhe was not able by any means to riſe: afterwards, when the fit was paſt, ſhe was diſturbed a good while, with a great palpitation of the Heart, an heavineſs of the ſenſes, and a great debility of the animal function. After that this Sick maid had liv'd ſubject to theſe kinde of fits, being very often repeated, for about 14. months, ſhe at laſt became Epileptical, that as often as the aſſault of the evill returned, being flung proſtrat on the Earth, ſhe was taken with the inſenſibility or amazedneſs of Spirits, with the foaming at mouth, and other peculiar ſymptoms of the falling-ſickneſs. Neither did this diſtemper ſtay here, but ere the ſpace of a year was elapſed, it degenerated into madneſs, that at laſt, the ſick maid, having loſt the uſe of her Reaſon, grew ſometimes mad with fury, and ſometimes was plainly ſtupid and fooliſh. *4 Obſervation.*

It is plain, from the beginning, progreſs, and often *metamorphoſis* of this Diſeaſe, that it at firſt, had its cauſe, and ſeat in the head, near the beginning of the nerves, and from thence, did dayly unfold more largely its bounds, both into the brain, and into the nervous Syſtem; for from the beginning, the morbific matter, conſiſting neer the beginnings of the nerves, Cauſed only lighter Spaſms or Convulſions, of the *Viſcera* and members, and ſhakings, with the *Vertigo*; afterwards, a portion of it being ſlidden into the pneumonic nerves, and their foldings, produced moſt grievous Convulſions of the *Præcordia*, *Diaphragma*, and *Ventricle*; *The reaſon of the aforeſaid Caſe.*

and also another portion of the same matter invading the Brain, and its marrow, caused the Insensibility or amazedness, and so the fits of the Falling-sickness; and at length, the texture of the spirits being wholly vitiated, and their *Latex* being degenerated into a most sharp, and as it were Stygian Liquor, the convulsive distempers pass'd into madness.

Therefore, as to the particular reasons, both of the disease, and symptoms, it seems, that the aforesaid Virgin, by her sedentary Life, (she being deprived altogether of the exercise of the body, and the use of a more free Air,) but chiefly by her nightly watchings, and being frequently interrupted of her sleep, she had contracted a vitious disposition of the blood, and humours, and also a praved and weak constitution of the brain, and Nervous stock (to which may be added, that she did perpetually attend on a master, sick of most grievous distempers of Convulsions, and by that means, had received perchance some contagion, or convulsive Infection : And first of all indeed, the Heterogeneous particles being poured forth, together with the nervous juce, into the brain and Cerebel, and there cleaving to the spirits, as it were skirmished with the preliminarie scotomie, and vertigenous distemper ; then the convulsive matter, settling upon the beginnings of the wandring pair and intercostal Nerves, and the spinal marrow, brought in, with the Vertigo, the leaping of the *Viscera* and Muscles, and their lighter shakings : Afterwards, when entring more deeply the pipes of the Nerves, it was carried into the Cervicall, and Cardiac, and perhaps intercostal, and other unfoldings, and embued the spirits, performing the office of respiration, and the pulse, with an explosive *Copula* ; they being brought into explosions at every turn, together with their superiors, inhabiting the nervous origine, by reason of fullness, or because of irritation, excited most horrid Convulsions of the respective parts : But the fit growing strong, from the pneumonic or breathing Nerves being strictly bound, the sudden inordinate systole of the Thorax, was stirred up ; then presently, the *Diaphragma* being suddenly, and vehemently drawn back, the obstreperous ejulation did succeed : Further, when by reason of the systole of the Thorax, being sometime continued, the blood being hindred, that it could not move, it *stagnated* altogether in the *præcordia*, therefore, during the fit, that great oppression of the heart, with want of speech and motion afflicted the sick maid : But in the mean time, while as yet the region of the brain remained free, and clear from the explosions of the spirits, the sick party remained in her senses, or memory : but afterwards when the Convulsive matter being dayly increased, it was unfolded in the middle or marrowy parts, of the debilitated and broken brain, to the former passions, about the *præcordia*, came also the Insensibility and amazedness of spirits, then the Epilepsie, and lastly madnesse, for the reasons before recited. Many medicines, and of various kinds, being prescribed to this sick maid, by many, both Physitians and Empericks, but confusedly, and with an uncertain method, being presently changed, did her no good.

§. Observation. A certain fair woman, well coloured, and well flesh'd, from a setled grief, fell into a sickly disposition ; about noon, and the evening, for the most part she was pretty well, but in the morning, when she had slept enough, and often indulg'd it too much, till she became very somnolent and heavy : being thorowly awakened, presently she was wont to complain of a heavinesse, and as it were a stupidness, in her whole head, with a *Vertigo* at every motion, or stirring about of her head ; a little after she constantly expected a convulsive fit, or the insensible amazedness of the spirits, and sometimes this, sometimes that, was wont to infest her : for that after the *Vertigo*, as it were a *prævious velitation*, for the most part, she felt in her ventricle, and left side, an heavy or weighty pain running up and down here and there ; hence belching, a striving to vomit, eruptions of blasts, also wonderfull distentions of the abdomen, and hypochondria, did follow, and sometimes for many hours, did miserably Exercise this woman ; but sometimes these Symptoms hapned to be wanting, and then the distemper more cruelly afflicted her brain : for falling into frequent insensible fits, she was wont to continue a great while immovable, and with her eyes shut, without sense or understanding ; and when her servants had moved her, by rubbings, and with the fume of Tobacco, she came by and by to her self, but presently again she fell into the like insensibility, and so for four or five times, before she could perfectly recover her self, and be without expecting to fall into these fits again : At length the Tragedy being acted,

acted, ſhe remained however affected with an heavineſs, and torpor of her head, in ſome meaſure: but about noon, all the clouds being diſcuſſed, ſhe was wont to obtain a fair, and ſerene diſpoſition of her whole head, untill the next morning, the ſame Symptoms would return again.

Who ſhall rightly weigh theſe Symptoms, need not ſuppoſe them vapours, ariſing from the womb, or ſpleen, and in thoſe ſeek for the morbific cauſe in vain: which truly may more certainly be placed in the head it ſelf: for it ſeems, that by reaſon of a great ſadneſs (which happens often to women) at the beginning, a great debility, together with a vitious taint, was impreſſed on her brain; ſo indeed that the animal ſpirits derived to the brain and Cerebell, brought with them, heterogeneous particles, of a mixt kinde, *viz.* Partly narcotick or ſtupifying, and partly exploſive or ruſhing forth: which kinde of Copula, when they had more plentifully conceived, through ſleep, they were ſtirred up to the ſhaking of it of, by mere fullneſs: as ſoon therefore, as the woman was awakened, the ſame ſpirits, being moved, either a bending downward being made below, they were depreſſed upon the beginnings of the Nerves, and there being exploſed, they excited Convulſions of the *viſcera*; or leaping back towards the middle of the brain, and being there ſtruck off, they brought in thoſe frequent and terrible Inſenſibilities. In truth, this diſtemper was ſomewhat akin to the Epilepſie, but that the morbific matter was not as yet ſtayed within the regal palace of the brain, or its middle part, ſo that there it might infect the ſpirits, within their Fountains; but yet, the ſame heterogeneous Copula, did cleave more ſtrictly to them, diſſociated or disjoyned below, and dividing themſelves into various and leſſer rivolets, according to the beginnings of the Nerves. In the mean time, the ſpirits, whereby they might ſhake off that matter, being often exploſed, cauſed the ſtupor, and Inſenſibility, but bending to ſome other place, they ruſhed upon the beginnings of the Nerves, for that reaſon caus'd thoſe Spaſms or Convulſions of the *viſcera*: But that the fits come only in the morning, after a plentiful ſleep, the reaſon was becauſe the heterogeneous Copula of the ſpirits, coming to them with the Nervous juce, was at that time gathered together to a fit fulneſs for exploſions, which being then wholly ſhaken off, the ſick perſon remained therefore all the reſt of the day, free from the diſtemper, till the next day, when the nights ſleep had brought to the head, a new ſupplement of morbific matter, the like fit returned in the morning; which perhaps, as the ſleep had been ſhorter or longer, was moved now within the brain, now near the nervous origine.

An Obſervation of a diſtemper as it were hyſterical in a man.

But it may be obſerv'd, that Convulſions have ariſen, from the nervous origine, being chiefly affected, not only in the female ſex, as the weaker and more lyable, but ſometimes, theſe kinds of diſtempers have been excited in men, from the like *procatartic* cauſe. Some years ſince, being haſtily ſent for from a ſtranger, who lodged in this Citty, at firſt ſight, I ſuſpected that he was poſſeſs'd, and believ'd that he had more need of Exorciſms, than of Medicines. He was about Forty years old, who had now for about three years, at certain ſet times of the year, been wont to be troubled with convulſive Motions; whilſt he by chance lodg'd here, for a few days about his occaſions, by reaſon of a great ſadneſs, he had a fit of his ſickneſs greater than uſuall: He was wont for two or three days beforehand, to feel the coming of his diſeaſe; to wit, from a great commotion within the forepart of the head, almoſt a continual *Vertigo*, and frequent dimneſs of his eyes: But the fit coming on him, at firſt his eyes were variouſly roled about, and inverted, then a certain bulk, like a living animal, was ſeen to creep from the bottom of his belly upwards, towards his heart and breaſt, and from thence to his head: I my ſelf preſſing his belly, with my hand, felt very plainly this kinde of motion, and as long as I hindred this round thing from aſcending, with both my hands, and all my ſtrength, he found himſelf indifferently well; but as ſoon as this ſwelling creeping upwards by degrees, had reached the head, preſently the members of the whole body were cruelly pull'd together, that he would daſh himſelf againſt the walls, or poſts, as if poſſeſt by an evill ſpirit; He could hardly be held, and reſtrain'd, by four ſtrong men, with all their force, but that he would leap from them, and fling out his arms, feet, and head, here and there, with divers manners of motions: when he ceaſed from leaping forth, or ſtrugling, his members would be ſtrongly extended, and his muſcles ſtiff, as if troubled with the Cramp, or ſtiff extenſion: ſuch a fit would laſt about a quarter of an hour, then coming

coming to himself, he would talk soberly, and walk about in his Chamber; he knew what he had suffer'd, and ask'd pardon of the standers by, presently after he began to draw his eyes inward, and swiftly to role them about: then presently the convulsive distemper returning, acted the like Tragedy as before: and after this manner, he would have five or six of these kinde of convulsive fits, within three hours space. In the midst of one of these fits, a vein in his Arm being opened, and a large orifice made, the blood flowed out slowly, and was seen presently to be congealed: and so indeed, that being received into the dish, it did not flow about, after the manner of Liquors, with a plain and equal *superficies*, but like melted sewet, drop'd into a cold vessell, one drop being heaped upon another, it grew to a heap.

The reason of the aforesaid Case,

If this strange distemper had hapned to a woman, it would presently have been said, that it was the mother, or histerical, and the Cause of it would have been laid on the fault of the womb; especially, for that the ascent of something, like a bulk, began the fit, from the bottom of the belly: But when this common solution, which most often is the mere subterfuge of Ignorance, cannot be admitted in this case, it seems most congruous to reason, to referr all these Symptoms, to the evill affections of the brain, and nervous stock. For truly it may be plainly gathered, that the cause of the disease, did lye hid in the head it self, by the Symptoms preceding the fit, which did denote a very great agitation of the spirits, within the head; that inflation of the brain, and heavy swimmings, which constantly came just as the fit was coming upon him, the turnings of the eyes, manifestly argue, that heterogeneous and explosive particles, did adhere to the spirits, dwelling within the *Encephalon*, near to the beginnings of the Nerves. So that this case, comes near to the nature of the Epilepsie, excepting, that the spirits within the middle of the brain, did not admit an heterogeneous Copula, nor being explosed in another place, did they tumultuously break forth there; for during the fit, the sick person was still in his senses, or had the use of his memory: But the morbific matter, being more plentifully laid up in the head, when from thence it was slid, more deeply into the pipes, both of the Interior und Exterior Nerves, it had placed mines of explosive seeds, very diffusive, in the *viscera*, both of the lower and middle belly, and also in the exterior members; so that, when the animal spirits began to be exploded, near the beginnings of the nerves, presently from thence, others inhabiting the mesenteric enfoldings, and then others in the other nervous enfoldings, interjected from the outmost bound, even to the head, being explosed in order, did even continue the Convulsions, from one part to another, untill they came to the head it self: but presently the explosion being translated from thence, to the spirits dwelling in the spinal marrow, and Appending Nerves, the most strong Convulsions of the muscles, and members of the whole body follow'd: But that, that ascent, as it were of a bulk, or substance which very often was perceived in the lower belly, about the beginning of the Convulsions, proceeding from the spirits, within the mesenterick enfoldings, being brought into explosions, shall be more largely declared anon, when we come to treat of hysterick passions.

In the mean time if it be ask'd, for what reason, that, the convulsive paroxysm, beginning in the part of the head, near the beginnings of the Nerves, presently the spirits dwelling in the outmost parts (as many as are pre-disposed for that Symptom) enter into explosions, and so transfer the convulsive Distemper, being there fully raised, upwards, (for it is for the most part so, whether the entrance of the disease begins in the bottom of the belly, or about the middle of the abdomen, the *Hypochondria* or *præcordia*, for that the Convulsion is wont to creep by degrees, from those places towards the head.) I say, for the solution of this, these two considerations are offer'd, to wit, in the first place we consider, that when some whole *series* of spirits is disturbed, those who reside in the extreamest bounds are first destituted of their originall Influence; wherefore, they, before others, grow tumultuous, and begin to grow irregular; hence it is, when the Nerve of the arm or thigh, is strained hard, by leaning on it, that the wonted Influence is hindred, that a numness, with a sense of pricking or tingling, is first felt in the fingers or toes; from whence by degrees, it creeps upwards towards the places affected. Secondly, the other is, and rather the reason of this distemper, to wit, that the spirits being ready for explosions, when they are contained within

Wherefore the Convulsions begin from the extremities of the Nerves.

in the nervous pipes, one or more, as ſo many diſtinct little Tubes, they require a ſufficient ample ſpace, in which they may be able very much, and indeed ſucceſſively to be rarefied, aud expanded; which thing becauſe it cannot be eaſily performed, within the Trunks of the Nerves, from the beginning towards the end, therefore while the Spirits, about the nervous origine, being firſt ſtruck off, leap back towards the *Encephaleon*, for that cauſe they ſtir up the Vertigo: the more open exploſion of the ſpirits, for the moſt part, begins about the inferior paſſages of the nerves, or at their extremities, where the Trunk of the nerve is either dilated, into more ample foldings, or terminated in more *fibres* largely diſperſed abroad; then thoſe Spirits being exploſed, there is room made preſently for others ſucceeding in order, whereby in like manner they may be exploded: Hence we may obſerve, whilſt the exterior Spirits are exploded, if a Ligature or hard Compreſſion being made, the ſucceſſion of others into the ſame ſpace, or their progreſs toward the exterior parts be intercepted, the Convulſion is wont to be hindred, that it cannot aſcend upwards: wherefore when a numbneſs (as medical Hiſtories teſtifie) being ariſen from the fartheſt end of the finger, or toe, creeps to the ſuperior parts, with a tingling, or like a cold air, and at length reaching the brain, cauſes moſt horrid Convulſions; if by and by after the motion is begun, the Arm or thigh be ſtrongly tyed, the Spaſm or Convulſion not being able to get over the bound place, is hindred from coming to the head; yea, it is uſuall for hiſterical women, as ſoon as the ſwelling of the belly, or the aſcent of the bulk in the *abdomen* is firſt perceived, to gird ſtrongly their waiſts, with Swathing-bands, and ſo oftentimes they prevent, the *Præcordia*, and the region of the brain, from being diſturbed, by that ſame Convulſive Fit.

Wherefore the blood is ſoon congealed in convulſive diſtempers.

But that the Blood, being let out in the mideſt of the fit, was ſo ſoon congealed, indeed it very ordinarily happens to be ſo, in Convulſive and Apoplectical Diſtempers, as the moſt learned *Heighmore* hath firſt noted, out of *Hendochius*: But that ſome from hence contend, that Convulſions rely altogether upon the thickneſs of the Blood, and ſtagnation, its motion being hindred, cannot be granted: Becauſe, the blood taken from thoſe who are ſubject to convulſions, a little before the fit, is dilated with *ſerum*, and fluid enough: wherefore, we may lawfully think, that, that Congelation is cauſed by the *paroxyſm* it ſelf, becauſe in Convulſive motions, and immoderate Contractions of the Nerves, and *Viſcera*, the interflowing Blood, by the exhalations of its ſpirit, and *ſerum*, is ſomewhat looſened in its mixtion, and therefore in ſome ſort coagulated; like as when milk, by reaſon of too much agitation, and ſeparation of the parts one from another, grows into butter; wherefore this kinde of Coagulation of the Blood, ſeems rather to be the effect, than the Cauſe of the Convulſions.

The Curatorie Method.

AS to the Cure of theſe kinde of Convulſive Diſtempers, which in women, or men, proceed from the morbific cauſe lying upon the beginnings of the Nerves. The firſt Indication will be, to draw away the tinder or inkindling of the diſeaſe, *viz.* to hinder, that the blood may not affix on the head, the heterogeneous particles, either begot in it ſelf, or received elſewhere from the *Viſcera*. For this purpoſe, an evacuation, both by catharticks, and blood-letting, unleſs ſomething contradict, is wont to be benificially preſcribed.

Emeticks

Vomiting moſt often brings help, wherefore Emeticks of the Infuſion of *Crocus metallorum*, or of the *Salt of Vitriol*, or *wine of Squills*, is to be taken at the beginning. Then almoſt the next day, the taking away of Blood, either by *phlebotomy* in the Arm, or by Leeches in the Sedal veins, is to be performed; then afterwards, a gentle purge of *pills*, or ſolutive Apozems, is to be ordained, and timely repeated.

Purges.

Take of the *pills* of the *Amber of Crato*, or of the *Tartar of Bontius* ʒ ii. of the Reſine of *Jalap*, *gr.* xvi. of *Caſter* ϑ i. of the *oyle of Roſmary* or *Amber*, ϑß. of *gumm-Ammoniac* diſolv'd in hyſterical water, what will ſuffice to make 16. pills. Let 4. of them be taken every ſixth, or Seventh day.

Take of the *Roots of Polypodia* of the *Oak*, of *ſharp pointed-docks* prepared, of *Chervil*,

chervill, each, ʒ vi. of the *male Pæony*, ʒ iii. of the leaves of *Betony*, *germander*, *Chamepits*, *Vervine*, the *male Betony*, each i. handfull, of the seeds of *Cardamums*, and *burdock* each ʒ iii. let them be boyled in 4. pints of Spring water till half be consumed: Let it be strained into a matrace, to which put of the leaves of the best *Senna*, ℥ i. of *Rhubarb*, ʒ vi. of *Turbith* gummed ℥ ß. of *Epithimum*, of *yellow-Sanders*, each ʒ ii. of the *Salt* of *wormwood*, and *Scurvy-grass*, each ʒ i. the yellow rine of the *Orange* ʒ ii. let them digest close, shut, in hot Sand for 12. hours. let the straining be kept for use, sweeten it (if there be need) with what will suffice, of the *Augustan* Syrrop, or of *Succory* with *Rubarb*. The Dose ℥ vi. once or twice in a week.

Every day, in which purges are not taken, Remedies strengthning the brain, and also the animal Spirits; for the taking away the heterogeneous *Copula*, or for the hindring them from running into explosions, are to be administred, which indeed ought to be prescribed and chosen, according to the Constitution, and habit of the Body, and temperament of the sick; for too lean bodys, and such as being indued with a more hot blood, medicines less hot, and which do not trouble the bloud above measure, ought to be given: On the Contrary, for phlegmatick and fat people, whose urine is thin, and watery, and whose Blood is Circulated more heavily, and *Viscera's* stuffed, more hot Remedies, and notably apt to ferment the humours, are designed. In the former Case, let it be prescribed, after this manner.

Remedies for a more hot temperament.

Coroborating medicines and Specificks.

Take of the *Conserve* of the *Flowers of Betony*, *Tamarisk*, the *male-Pæonie*, each ℥ ii. of the *Species* of *Diamargerit frigida* ʒ iß. of the *powder* of the Root of *Pæonie*, and of the seeds of the same each ʒ i. of *red-Corall* prepared ʒ ii. of *vitriol of steel*, ℈ ii. of the *Salt of Wormwood*, ʒ ii. with what will suffice of the juce of Oranges, make an *Electuary*, take of it twice or thrice in a day, drinking after it a little draught of the Julap hereafter prescribed.

Powders.

Take of *Corall* Red, with the juce of Oranges, beaten together in a glass, or marble mortar, and dry'd, ℥ ß. of the powder of *misletow* of the *oake*, of the root of the *male Pæonie* ʒ ii. of perled sugar, ʒ iii. make a powder, the dose from ℈ i. to ʒß. twice or thrice in a day.

Take of the *Species* of *Diamargarit frigida* ʒ ii. of the *Salt of wormwood*, ʒ iii. of the root of *Cocowpint* powderd, ʒ i. mix them, make a powder, let it be divided into xx. parts, take a dose in the morning, and at four in the afternoon.

Take of the *Roots of Butterbur* ℥ i. dose ʒß, to ʒ i. twice in a day.

Distilled waters and Julaps.

Take of the *Leaves of Burdock*, and *Cocowpint* each vi. handfulls, let them be cut and mixed together, and so distilled. The dose ʒ ii. to iii, twice or thrice a day, after a dose of *Electuary* or *powder*.

Take of this water distilled ii. pints, of our *steel* prepared, ʒ ii. mix them in a Vial, let it be taken after the same manner.

Take of the Simple water of *walnuts*, and of *black-Cherries* each half a pint, of *Snales* ʒ iii. of the Syrrop of the flowers of the *male Pæonie*, ℥ ii. the dose ℥ iß. to two, after the same manner.

Take of the *shavings* of *Ivory*, and *harts-horn* each iii. drams, of the *roots of Chervill*, *burdock*, *Valerian*, each half an ounce, of the leaves of *Betony*, *Chamepits*, *harts-tongue*, the tops of *Tamarisk*, each one handfull, of the barks of *Tamarisk*, and of the *woody nightshade*, each half an ounce, let them be boyled in two quarts of spring water, to the consumption of the third part; add to it of *white-wine* eight ounces, strain it into a pitcher, to which put of the leaves of *brook-lime*, and *Cardamine*, each one handfull, make an Infusion warm, and close for four hours: Let the colature be kept close in glasses. The dose ℥ vi. twice in a day, after a dose of some solid Medicine; sometimes such an *Apozme* may be mixed with ʒ ii. of our *steel*, and taken in the same manner.

In the Summer time, the use of *spaw-waters* is convenient, and for want of them, our Artificial ones may be taken.

Remedies in a more cold temperament.

If that for the reasons above-recited, more hot Medicines are to be prescribed, you may proceed according to the following method.

Electuaries.

Take of the *Conserves of Rosemary*, of the *yellow* of *Oranges*, and *Lemmons*, each ℥ ii. of *Lignum aloes*, of *yellow-sanders*, of the roots of *snake-weed*, *Contrayerva*, *Angelica*, *Cocowpint*, each ʒ i. of the *vitriol of steel* (or of *steel* prepared) ℈ iiii. of the *salt of wormwood*, and *Scurvy-grass*, each ʒ i. with what will suffice of *candied Wall-nutts*,

nuts, make an Electuary: Let it be taken twice in a day, to the quantity of a nutmeg, drinking after it a dose of appropriate Liquor.

Take of the *Roots of male-Paony*, *Angellica*, and *red Coral* prepared, each ʒ ii. of *Sugar* dissolved in the water of *Snales*, boyled to the consistency of Tablets, ʒ vi. of the *oyle of Amber* lightly rectified, ʒ ß. make a sufficient quantity of *Lozenges*, each weighing about half a dram, take one or two twice or thrice a day, drinking after it a dose of proper Liquor. *Tablets.*

Take of the *Roots* of *Virginian Snake-weed*, *Contrayerva*, *Valerian*, each ʒ ii. of *red Coral*, and prepared Pearl, each ʒ i. of *winteran Bark*, and of the *root of Cretian Dittany*, each ʒ i. of the *Vitriol of Steel*, and *Salt of wormwood*, each ʒ iß. of the extract of *Centaury* ʒ ii. of *Ammoniacum* dissolved in histerical water, what will suffice, to make a pillulary mass: of which take four pills, in the morning, and at four in the afternoon. *Pills.*

Take of the *Spirits of harts-horn*, or *Sut*, or *humane Blood*, or of *Sal ammoniack*, what will suffice, take of them from 10. to 12. drops, morning and evening, in a spoonfull of Julap, drinking a little draught of the same after it. *Spirits.*

Take of the *Leaves of Betony*, *Vervine*, *Sage*, *Lady-smocks*, *Cocowpint*, *Burdock*, each two hand-fulls, of *green wallnuts*, number 20. the *rinds* of six *Oranges*, and of 4. *Lemons*, of *Cardamums*, and *Cubebbs*, each ʒ i. being cut and bruised, pour on them of whey made of *Cider* or *white wine*, six pints, let them be distilled according to Art. The dose ʒ ii. or iii. twice in a day, after a dose of a solid medicine. Add to i. quart of this liquor ii. drams of our *Steel*. *Distill'd waters.*

Take of the *Water of Snailes*, and of *earth-worms*, each ʒ vi. *walnuts simple*, ʒ iiii. of *Radish* Compound: ʒ ii. of *white sugar* ʒ ii. make a Julap. The dose 4. or 6. spoonfulls, twice in a day, after a dose of a solid medicine.

Take of *millipedes* or *chesslogs*, cleansed, i pint, of *Cloves* cut, ʒß. put to them i. quart of *white-wine*, let them be distill'd in a glass-Cucurbit. The dose ʒ i. to ʒ iß. twice in a day.

For poor people, medicines easie to be prepared, may be prescribed after this manner.

Take of the *Conserves* of the *Leaves of Rue*, made with an equal part of *sugar*, ʒvi. take of it the quantity of a *nutmeg*, twice in a day, drinking after it of the decoction of the *Seeds* and *Roots of Burdock*, in *whey* or *posset-drink* made of *white-wine*.

Or there may be prepared a Conserve of the *leaves* of the *Tree of Life*, with an eqnall part of Sugar: dose ʒß. to ʒ i. twice in a day.

Take of *millipeds* prepared ʒ iii. of *ameos seeds* ʒ i. make a powder, divide it into 10. parts, take a dose twice in a day, or 12 *Sows* or *woodlice* bruised, and white-wine, put to them, let the juce be wrung out, make a draught, let it be taken twice a day.

In the mean time, while these Medicines are taken Inwardly, it is sometimes convenient to raise blisters, with Vesicatories, in the nape of the neck and behinde the ears; for so the serous and sharp humours, are very much brought away from the head: besides, sneezing powders, and such as purge Rhume from the head, often give signal help. The taking away of Blood from the Sedal veins, or the foot, ought sometimes to be itterated; yea, and the Distemper urging, *Plaisters* or *Cataplasms*, are profitably applyed to the soles of the feet. It is also beneficial to apply drawing medicines, about the calves and thighs.

CHAPTER VI.

Of Convulsive Motions, whose cause subsists about the extremities of the Nerves, or within the nervous foldings.

SOmetimes Convulsive distempers do arise, without any fault in the Head, by the irritation and explosion of the spirits, remaining about the extremities of the nerves, which plainly appears, because, when medicines haul sharply the Ventricles or Intestines, or worms gnaw them, there do not only follow Convul-

sions in those parts, but besides, convulsive motions do sometimes torment (or are retorted on) the members, and outward Limbs: for indeed, as we have shown elsewhere, when the sense of a very grievous Trouble torments any part, and from that is communicated to the chief Sensorie, presently from thence, an involuntary, and irregular motion, is wont to be reflected on the spirits in that place irritated; and that not only by the same nerves, to which the sense of the pain was carried, but sometimes also the Convulsion is reciprocated, by others, either neighbouring, or altogether extraneous: So the Stone being fixed in the Ureters, and irritating very much its nervous *fibres*, excites Convulsive motions, not only in the distemperd Vessell, but almost in all the *Viscera* of the Abdomen; So that, the urine being suppressed, Torments diffused here and there, and very often horrid Vomitings follow. Wherefore, 'tis not at all to be doubted, but that both diseases, and some Convulsive Symptoms, are very often induced, by reason of an outward hurt, brought to the Tops of the Nerves, terminating within the membranes, muscles, or *Viscera*: yea, in the hysterical, *hypochondriacal*, and certain other passions, if at any time Convulsive motions are excited, in the hurt head, by the fault of the womb, spleen, or other Inward; verily they arise by this only means, to wit, by the Trouble of the rest of the parts, being translated this way through the Nerves, (but in no wise, by the Vapours) to the brain, and are propagated, all about, into various Regions of the Body.

Convulsions begin from the ends of the Nerves, both by reason of irritation.

But it should here be noted, that although the evident Solitary cause, forasmuch as it is strong and vehement, may sometimes induce Convulsions of it self, and without a prævious disposition: because indeed the Animal Spirits being irritated, beyond measure, begin greater and more than ordinary explosions, as in overgreat purging, and Vomiting, and the fits of the Collick, and Stone, is ordinarily wont to happen; yet in many other Convulsive Distempers, whose fits are often and habituall, besides the irritation made, about the extremities of the nerves, which serves for the most part for the evident cause, also a certain more remote cause is present, to whose efficacy the assault of the disease is chiefly beholden; to wit, when Convulsive motions are wont to be excited, and at every turn repeated, by the fault of the Spleen, womb, or other private part, it may be suspected, that the animal Spirits, of the *Fibres* in the distemperd part, and those disposed in its neighbouring parts, had first contracted an heterogeneous, explosive *Copula*, by which being filled, to a running over, they were provoked, by a light occasion, to Convulsive explosions: Then, those being first begun, about the extremities of the nerves, creep upwards by the passage of the same nerves, and are often caryed to the same nervous origine, and sometimes beyond, to the middle of the brain: from whence, lastly, being reflected, on the nervous stock, they also secondarily, cause the Convulsions of the members, and Limbs: But after the Brain, and a Superior portion of the nervous System, are wont to suffer, and be affected often, by the Convulsions below excited, the spirits inhabiting those parts, also begin to be themselves adulterated at length, and to admit an heterogeneous and explosive *Copula*, and so to acquire, in part, a procatartick cause; hence at length, a Convulsive procatarxis or more remote cause, becomes Common to either end of the Trunk of the same nerves, and the animal spirits of one nerve, or more, being evilly disposed, both at the head and tail, conceive explosions from either part, and deliver them presently to the other, as shall be more largely declared below, when we treat particularly of hysterical, and other passions. in the mean time, we will add some histories, and observations, of Convulsions, arising from the farther ends, or extremities of the Nerves.

And by reason of an Explosive Copula.

1. Observation. A fine maid, about the 16*th.* year of her age, falling from her horse, and lighting upon a Stone, grievously hurt her left breast, from whence a Tumor arose, with pain, which Symptoms notwithstanding by the use of medicines, at the beginning seem'd to be mitigated, and to be indifferently well, for a long time after. Three years after, she having taken cold, and having observed but a bad course of dyet, all things began to be exasperated, the hurt part swelling into a bigger bulk, troubled her with an accute, and almost continual pain, that the sick Virgin, for the cruel torment, could take no rest, for many days and nights, neither could she suffer the *glandula's* of her Breast, being then made more tumid, to be either touch'd or handled, yea nor any noyse, or shaking to be made in the Chamber.

When

When to this Tumour, about to degenerate into a Cancer, they had applyed fomentations, and Cataplasms of *hemlock*, and *mandraks*, and other stupifying and repercussing things, this gentlewoman began to suffer certain Convulsive affections, infesting her very often: At first, as often as the pain in her breast did most cruelly torment her, she felt in that place, prickings, also convulsions, and contractions, running about here and there: then presently her *Ventricle*, and *hypochondria*, and often the whole *Abdomen*, were wont to be inflated, and very much distended, with an endeavour of belching, and Vomiting; by and by, the same distemper, being leasurely translated to the superior parts, excited Insensibility; to which shortly after, Convulsive motions succeeded,, in the whole Body, so strongly, that the Sick party could scarce be held, by three or four strong men.

These kinde of fits, at first were wandring, and only occasionally excited: to wit, they would come, as often as the pain of her brest was strained, by some evident cause: Afterwards, these Convulsions did more often infest her, and at last, they became habitual, and periodical, twice in a day, to wit, they were wont to come again constantly, at so many set hours after eating: And when after this manner, the sick Gentlewoman, had been miserably afflicted, for six months, at length, she began to be molested with a vertiginous Distemper of her head, exercising her almost continually: for which evill, when a fomentation of aromatick and cephalick herbs, had been a good while administred to her head, she became better, as to the giddiness; but then she was perpetually infested, with a quite new, and admirable Symptom, *viz.* an empty cough, without spitting, night and day, unless when she was overwhelmed with sleep: After this worthy Virgin, had tryed without much benifit, diverse medicines and remedies, prescribed by several Physitians, she was at last helped, by making use of the most temperate Bath, at the *Bath*; then being presently married, after she had conceived, and was brought to bed, she by degrees grew well.

If the reasons of the whole disease and its Accidents, be inquired into, without doubt, the convulsive distemper, was first of all excited from the tumour, or pained place of the breast; the cause of which was, partly the most sharp sense of pain, being impressed from its *fibres* and nervous parts, but partly by the heterogeneous Copula, being affixed on the spirits inhabiting those *fibres* and nerves; for truly, it may be suspected, that the most sharp humour impacted in the Tumor, which perhaps had in some sort flowed thither, by the passages of the Nerves, being repercussed, by the use of Topicks, had entred the *fibres* and nervous filaments, or little strings disposed thorow the whole border or neighbourhood, and so the heterogeneous, and explosive Copula, had clove to the spirits; for the shaking off of which, as often as by pain they were excited, they entred into convulsive explosions, and together with them, other spirits flowing within the neighbouring Nerves, by consent of the forms (as it often happens) were exploded after the same manner: Then the convulsive distemper, when it first had begun in the extremities of the Nerves, being continued thorow their passages, even to the head, was wont to cause the insensibleness, and from thence, leaping back upon the whole *nervous system*, the convulsive motions, of the Limbs and all the members: The fits, about the beginning of the sickness, being excited after this manner, by reason of pain, from the distemper'd part, were carried secondarily to the brain, and its appendix: But afterwards, when the spirits inhabiting those places, being often explosed, by sympathy, had so loosned, and weakned the pores of the containing parts, that there lay open a passage, within the same, for all heterogenious particles to enter, with the nervous juce, the convulsive *procatarxis* or more remote cause, also increased in the head; and the spirits inhabiting the *Encephalon*, being infected with an heterogenious Copula, they themselves begun the convulsive fit, or at least afforded the first instinct to its assalt, which did return, for the most part, at such set hours after eating, because the morbific matter, was carried in, together with the nervous juce, almost in an equal dimension: In truth, in such cases, where the convulsion being generall, doth possess almost all the parts of the whole *nervous system* successively, we may suspect, that the animal spirits, had contracted an heterogenious and explosive Copula, in the whole nervous stock, which, when it is arisen, at the set time, to a fullness, incites the spirits themselves, at the appointed time, in like manner

The reason of this.

ner to exploſions, and the ſame exploſion, being begun ſomewhere, is propagated in order, to all, after the manner of a fiery enkindling.

As to that empty cough, which ſucceeding the fomentation of the head, exerciſed this ſick perſon allmoſt inceſſantly for many months ; it ſeems, that this Symptom ſhould depend altogether from the *nervous origine* being diſtemper'd, and not at all ou the ſtuffing of the Lungs, for ſhe did not avoid any thing with the cough ; and if at any time that force of coughing was violently reſtrained, preſently ſhe was troubled with the ſenſe of choaking in her Throat : So that, as it is very likely, the morbific matter laid up near the *nervous origine* being rarified and ſtirred, by the fomentation, entred more deeply the heads of the nerves, appointed for the Lungs, and ſtirred up in their *fibres*, and *filaments*, perpetuall convulſions : after the like manner, as when the nervous juce, which waters the *fibres*, and tendons of the Muſcles, being made ſharp, and degenerate, induces to thoſe parts, continual leapings and contractions : hence, when a Convulſion or ſpaſm was ſtop'd, in ſome branches of the diſtemper'd Nerves, ſo as ſhe could not cough, preſently the Convulſive motion, running into other branches, of the ſame neighbour Nerve, ſtirred up that choaking in the Throat. I will here propoſe another example of a Convulſion, ariſing from the extremities of the Nerves being affected.

2. Obſervation. A noble Matron, of fifty years of Age, after her courſes had left her for about half a year, began to complain, firſt in a pricking pain of her left pap, then afterwards, that diſtemper leaving her, ſhe was ill about her ventricle, for there aroſe an hard, and as it were a ſchirrous Tumour, with a ſad pain ; upon this came an inflation of the ſtomach, with difficulty of reſpiration, a nauſeouſneſs, and frequent Vomiting : Then the diſeaſe encreaſing, with a more ſharp pain running about here and there, ſhe fell into Convulſive diſtempers of the ventricle : to wit, in that place, ſhe was allmoſt continually troubled, with Convulſions variouſly running about, juſt as if her ventricle had been torn to pieces : Beſides a conſtant perturbation of minde, with thirſt, and watchings, and a freqnent *deliquium* of ſpirits, as if ſhe had been juſt dying, exerciſing this ſick Lady : All which ſymptoms, ſhe plainly perceiv'd to ariſe, from that Tumour in her ventricle : They ſaw that all vomitory, cathartical, antiſcorbuticall, and hyſterical Medicines, did her no good, but were rather hurtfull, and troubleſome ; ſhe received ſome benefit, by the taking away of blood by Leeches, and by the uſe of Aſſes milk, and afterwards ſhe was much eaſed, by the long drinking of ſpaw-waters.

The reaſon of it. The aforeſaid Symptoms, which commonly are aſcribed to the hyſterical paſſion, and the vapours from the womb here plainly appear, to have proceeded from a Tumour, ariſing about the bottom of the ventricle : for that the blood of this Lady, being very hot, and melanchollick, when it could be no more purged, by her courſes, flowing from her, it laid up its recrements, and aduſt fæculencies, at firſt in her breaſt, and then from a new beginning, in the membranes of her ſtomach : From the tumor there made, ſharp and heterogenious particles falling down perpetually, entred the *fibres* and nerves, planted round about ; which cleaving continually to the ſpirits, dwelling in, and flowing into thoſe parts, excited them to frequent exploſions, and ſo made Convulſive diſtempers, in all the neighbouring parts : But that ſometimes the convulſive motions were more light in that place, hence it appears, that the whole nervous ſtock, and the head it ſelf (as is wont to be in greater convulſions) had not as yet been touched, with the ſame diſtemper : But the diſorder of ſpirits, ariſing about the parts affected, and from thence transfer'd, by a ſmaller undulation or waving to the head, and ſo only lightly diſturbing the ſpirits, inhabiting it, induced watchings, with a great heat, and perturbation of the phantaſie, what we have hitherto diſcourſed of Convulſions, from the morbific cauſe ſetling upon either end of the nervous ſyſtem, will more clearly appear, when we ſhall hereafter trear particularly of the chief kinds of convulſions, *viz.* the hyſterical, hypochondriacall, and other paſſions : In the mean time, there will be no need to add a Curatory method, for this *Hypotheſis* of convulſions, ariſing by reaſon of the extremities of the nerves being affected, becauſe the ways of curing may be better accomodated, to the paſſions of this kinde, hereafter particularly to be ſpoken of : But for the preſent, it behoves us, to proceed to the unfolding of the convulſive paſſions, whoſe cauſe, or morbifick matter, ſeems to ſubſiſt, within the nervous foldings.

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We have largely enough, in another place, diſcourſed of the nervous foldings, and in their deſcription, and uſe, we have ſhown, that 'tis very likely, the more grievous fits of convulſive motions, beginning oftentimes within theſe parts, are from thence propagated on every ſide, into the neighbouring parts, and not ſeldom to a great diſtance: at leaſt, that it ſeems much more probable, that the heterogenious and exploſive particles, after they have overcome the tract of the head, and its medullary *appendix*, and being more deeply ſlidden into the Channells of the Nerves, and their paſſages, together with the juce watering them, do ſpread their ſtores within the nervous foldings, as it were in Croſs-ſtreets, and by paths, and there ſometimes make their ſtations, untill at length, being more plentifully heaped up, they as it were with Collected forces, produce the more cruel convulſive diſtempers: This I ſay, appears to be much more probable, then (what is commonly ſaid) to ſuppoſe them vapours, ariſing from the womb, ſpleen, ventricle, or any other inward, in which all the fault is eaſily thrown: For within theſe foldings, there are ſpaces large enough, for morbific mines, that the matter may be there at leaſure laid up, and remain, till it be gathered to a fullneſs: But then, becauſe we believe, that great plenty of ſpirits lodge there, more than in any other little cells, the heterogenious *Copula* growing to them, lays as it were tinder for more grievous exploſions, ſo that, the ſpirits being exploſed within theſe bodies, do not only inflate, and dilate them, but elevate and lift them up, from their Place (even as a houſe blown up with gun-powder;) wherefore the parts lying over them, are ſuddenly lifted up into a tumour, and looſe are drawn violently hither and thither. That after this manner, the more cruell fits of Convulſions, about the *præcordia*, and *Viſcera*, are very often ſtirred up, I have found to be true, beſides the Arguments taken from reaſon, not long ſince by my own ſight: For when I opened the dead body of a Gentlewoman who had been exceedingly troubled with (as they ſay) the Mother fits, or hyſterical Diſtempers, I found the womb wholly faultleſs, but the Nerves near the foldings of the *Meſentery*, (as it ſeem'd) only to be lifted up, and elevated into a bulk, and the membranes of that inward, appeared torn, and looſned one from another, as being on every ſide tumid, and looſe, as it were blown up into little bubbles, or bladders.

That the nervous foldings is the ſeat of Convulſive matter.

Indeed there are more conſiderations of ſolid reaſons, whereby we are induced to believe, that the paſſions called hyſterical, do moſt often ariſe, from the convulſive matter, heaped up within the *Meſenterick* enfoldings, and by turns exploſed: which ſhall be more clearly manifeſted, where we treat eſpecially of thoſe diſeaſes: But, neither is it leſs probable, that the Collick-pains, do very often proceed, from a more ſharp and irritative matter, contained in the ſame enfoldings. Beſides, as often as the convulſive fits ſeem to begin from the ſpleen, or ventricle, by reaſon the beginnings of which are inflations, and very great diſturbances of thoſe parts, it is likely, that the neſt of the convulſive matter, was hid within the nervous enfoldings, belonging to the ſpleen or ventricle: Alſo, this kinde of matter, ſeems to excite within the Cardiac foldings, moſt heavy tremblings, and paſſions of the heart; and within the pneumonic, or cervical, (or thoſe belonging to the Lungs and throat) enfoldings, moſt terrible fits of the Aſthma. In our Treatiſe of the Nerves, we have related a notable caſe, of a worthy Gentlewoman, to whom a ſerous matter, wonted to diſtill from the forepart of her head, through her left noſtrill, fell down behind her ear: where, when the moſt cruel pain did infeſt her, Convulſions alſo, and admirable contractions followed: whereby the joynting or compaction, now of the brain, and the whole head, ſeem'd to be pulled downward, now the throat, *præcordia*, and *Viſcera* upwards: which kinde of Convulſions, vexing the parts ſo oppoſite, and at ſuch diſtance, by turns, when they did proceed from one and the ſame ſeat, of the diſeaſe, planted in the midſt, it will be obvious to conceive, that the grieved place, as the origine of either convulſive affection, was the ganglioform enfoldings, planted near the *Parotidæ*, or the two chief *Arteries* of the throat: into which, the Nerves both of the wandring pair deſcending from the head are entred, and out of which the ſhoots do ſtretch themſelves, into the muſcles of the throat and branches, into the *præcordia*, and *viſcera*. Further, from the ſame cauſe, to wit, the convulſive matter, heaped up, and by turns exploſed, within the ganglioform enfoldings, we think, (and not undeſervedly) that ſenſe of

3. *Obſervation.*

choaking

choaking in the Throat, so often excited in the convulsive fits, did proceed. But there will be a more fit place, to speak of this, when we shall particularly handle, the convulsive diseases, and symptoms. We shall now endeavour, to search into what remains, of the last kind of Convulsions, of which we made mention above, to wit, which relies on the nervous Liquor being infected, thorow its whole mass, with heterogenious and explosive particles, and for that reason, irritateing the whole processes of the Nerves, and the nervous bodies, into universal Spasms, or Convulsions; and those either continual, or intermitting.

CHAPTER VII.

Of Convulsive Motions, arising from the Liquor watering the nervous Bodies, and irritating their whole processes into Convulsions.

THat Convulsive distempers do sometimes wander thorow the whole nervous stock, and infest now these parts, now those, now many together, is so noted, and obvious almost to dayly experience, that nothing can be more: we may therefore take notice, in these, that the tendons of the Muscles, do every where leap up, and are drawn together with spasms; in others, some exterior members, are bended, or stretch'd forth, with various flections, and contortions, here and there, after divers manners, we have seen some, forced by the unbridled, and untamed force of the spirits, as if struck with madness, to run, or leap about, or strongly to smite, with their feet, or fists, the earth, or any objects: which if they should not do, forthwith they would fall into swooning fits, and horrid Eclips of spirits. It would be too tedious, to enumerate all the cases of universal Convulsions, wandring thorow the whole nervous stock: But the symptoms of this kind, tho they are various, and manifold, may be reduced nevertheless to three chief Heads; to wit, forasmuch as they depend chiefly upon three kindes of causes; for indeed, in these wandring Convulsions, we ought to suppose, the whole nervous Liquor to the vitiated, and the animal spirits, flowing every where in the same, to be adulterated, and for that reason, to be allmost perpetually exploded: Take notice then, that this kinde of Infection, is most commonly impressed on the nervous juce, and the spirits every where flowing in it, by one of these three ways, *viz.* 1st. By Poysons or witchcraft. 2dly, From malignant, or ill-cured feavours, in which the morbific matter is poured forth, on the Brain, or nervous stock. Or 3ly, when the nervous Liquor, by a long tract of time, by reason of the scorbutic, or otherwise vitious distemper, doth degenerate from its due constitution, into sour, or acid, or any otherwise præternatural, and Convulsive Liquor: we will here consider of each of the aforesaid cases, and first of all, of the fits of Convulsion, which are produced by poysons, or Sorceries.

Chiefly three kinds of causes of universall Convulsions.

From poysons and sorceries.

From poysons of the rank of vegitables.

From a mad Dog.

First therefore, it is somewhere shown by us, that some poysons, do act rather on the nervous Liquor, than on the blood, which depraving it, most strongly induce Convulsive distempers: And it appears clearly, from the eating of *Hemlock*, the *laughing-Parsly*, *man-drakes*, the furious *nightshade*, *wild Parsnips*, and other hurtfull herbs, how soon after, horrid Contractions of the *Ventricle*, *numbness*, *delirium*, Convulsions, twitches of the *tendons*, in the whole body, were wont to follow: Besides, those kinde of Convulsions follow upon the biting of a mad Dog, and other venomous beasts, where the Virulent infection, being received by the nervous juice, and lurking a long while in it, at last puts it self forth, and infects, and poysons, the whole mass of Liquor, in which it was involved, with its ferment. But what doth yet more illustrate it, are the admirable Symptoms, the truly painfull Convulsions, and unweariable dancing, which Authors have related to follow, upon the biting of the *Tarantula:* and indeed, might seem fabulous, unless that the truth ef the Thing were asserted, by many men of good Credit, both ancient and modern: For besides *Mathiolus*, and *Epiphanius*, *Ferdinand*, *Gassendus*

ſendus, and *Kircher*, add, that themſelves were eye-witneſſes, of this diſtemper: yea it is ſaid, 'tis a known thing in *Apulia*, and found almoſt by dayly experience, that in that part of the Country, there are *Phalangii*, or a certain kinde of Spider, which is called *Tarantula*, from *Tarenta*, an ancient City of *Apulia*. This little Animal, being very frequent in the Summer, often bites the heedleſs Countryman, and infects him with its Venemous ſtroke, from whence preſently ſucceed, a pain in the hurt part, with a Tumor, and itching, by and by, in various parts of the body, a numbneſs, and Trembling, alſo Convulſions, and looſnings of the members, and other Convulſive Symptoms, with a great loſs of ſtrength; as may be collected from *Mathiolus*, *Ferdinand*, and others, relating the wonderfull effects of this Diſeaſe. But truly, what theſe Authors ſay concerning the cure of this Diſtemper, and is practis'd commonly thorow the whole Country, is worthy of great admiration: for thoſe ſtung with a *Tarantula*, as very ſick as they are, as ſoon as they hear muſical Inſtruments, preſently they are eaſed of their pains, aud leaping into the middle of the room, they begin to dance, and jump about, and ſo continue it, a long while, as if they were well, and ailed nothing: but if it happen, that the Fidlers leave off never ſo little a while, they ſtraitways fall to the ground, and return to their former pains, unleſs by the inceſſant muſick they dance, and leap, till the poyſon be wholly ſhaken off: For this end therefore, Muſitioners are hired, and are changed by turns, that without intermiſſion of the noiſe, thoſe who are bitten, may dance ſo long, till they are quite cured. Thus ſaith *Mathiolus*: to which *Ferdinand* adds, that poor people do expend almoſt all their ſubſtance, in theſe fidlers, and muſitians, who wander up and down all that Province; and by playing to theſe *Tarantulaſized* people, make much benifit: they dance or leap about, in the villages, and pubiick ſtreets, and fields, ſome one day, ſome one week, and others more. To theſe Authours, the moſt learned men *Gaſſendus*, and *Kircherus* agree, both of which, have related it from their own obſervation, that they have known ſuch affected; and they aſſert, that they are not affected, or excited, indifferently with any muſick, but with certain kinds of Tune, and that they dance to ſome meaſures, before others.

The reaſon of the ſymptoms of thoſe bitten by a Tarantula.

Let us inquire a little further, into the Reaſons of theſe aforeſaid Accidents, if we may follow our conjecture, in this firſt place, 'tis without doubt, that a certain venemous infection is fixed on the humane body, from the bite of this little creature, which tho it being leſs infeſtous to the blood, and vital ſpirit, as ſoon as ever it paſſes from it, into the nervous Liquor, it preſently unfolds it ſelf, thorow its whole maſs, like leaven, and infects the animal ſpirits, flowing every where in it; ſo that indeed, they being drawn one from another, and here and there inordinately moved, induce convulſive diſtempers, which are accompanied now with the contractures, now with the languiſhing, and reſolutions or looſning of the containing parts.

In what the reaſon of the Muſicks allaying the ſymptoms conſiſts.

But why the painfull Convulſions, which are raiſed by the bite of the *Tarantula*, being preſently allayed by muſick, are wont to turn into dancing, does not ſo plainly appear. That ſome affirm, this little animal (for that by the teſtimony of *Ariſtotle* it ſhould be moſt wiſe) to be delighted with muſick, and for that reaſon, its venom being impreſs'd on man, by fermenting the humours, to induce the like love of muſick: I ſay, this conjecture will not ſatisfie a minde deſirous of Truth, becauſe, that ſuppoſes a muſick-loving nature in the ſpider, aud the ſame to be communicated to man, by a *mataſtaſis*, or as it were a certain *metempſychoſis*, or tranſmigration of ſoul, both which are taken upon truſt, and little ſatisfactory, but it may be rather ſaid, that the venome inflicted on the nervous liquor, by the bite of the *Tarantula*, is too gentle, to be able to extinguiſh wholly the Animal ſpirits, or to diſſipate them very much aſunder, and to compell them into more cruell exploſions, but only to put them to flight, and to incite thoſe flying here and there, into lighter, and ſomewhat painfull Convulſions; and that the Muſick, with its flattering ſweetneſſe, doth congregate together, and mutually aſſociate, with eaſe, the ſpirits ſo diſſipated: wherefore, whenas the ſame ſpirits, by reaſon of the Infection ſticking to them, are apt to involuntary and Convulſive motions, the melody diſpoſes them, delighted together, and directs them to ſuch Convulſions, that entring the bodies of the nerves, by a certain Courſe, and Order, they are carried as it were in certain preſcribed limits and compaſſes, until at length the particles of the venome, being quite evaporated,

and

and the fury and rage of the ſpirits being worn out, they wholly ſhake off that madneſſe. For truly, muſick doth eaſily carry men ſound and ſober, whether they will or no, or thinking of another thing, into actions anſwerable to the ſound of the harmony; that preſently the ſtanders by, at the firſt ſtriking up of the Fiddle, begin to move their hands and feet, and can ſcarce, nay are not able, to contain themſelves from dancing: Let none therefore wonder that in men bitten by the *Tarantula*, when the animal ſpirits being moved, as it were with goads, they are compelled to leap forth, and wander about hither and thither willingly, if they are excited to dancing, and compoſed meaſures, at the ſtroke of an harp; ſo that as in theſe diſtempers, the ſpirit of the muſick, as it were inchanting the outragious ſpirits, and in ſome meaſure governing, and changing their convulſive motions, ſerves inſtead of an Antidote: for that the animal ſpirits, being very much, and for a long while exerciſed, after this manner, wholly ſhake off the Elaſtic *Copula*, contracted by the poyſon, or otherwiſe; and they being very much wearied, at length reſt from that madneſs, or its incitation.

A deſcription of the dance of St. Vitus.

That which is called the *Dance of* Saint *Vitus*, is an evill akin to this, concerning which *George Horſtius* relates, that he had ſpoken with ſome women, who for ſome years, viſiting the ſhrine of St. *Vitus*, which is in the borders of *Ulme*, did there exerciſe themſelves, even night and day, with dancing and diſcompoſure of minde, till they fell down like people intranc'd: by which means, they ſeemed to be reſtored to themſelves, that they felt little or nothing for a whole year, till about the time of *May* following, when by the inquietude of their members, they ſay'd, they were ſo far tormented, that they were forced to go for their health ſake, yearly, to the aforeſaid place, about the feaſt of St. *Vitus*. *Horſt. Epiſ. Med. ſect. 7. de admirandis Convulſionibus.*

The reaſon of it.

Indeed it is a uſuall thing (as I have obſerved) both for men, and women, to be ſometimes tormented with this inquietude of their members, and as it were with a fury or madneſs, that they have been forc'd to walk, till they were tyred, as alſo to dance, leap, and run about, here and there, that by this means they might ſhun the grievous trouble, and ſometimes faintings away, which were about to invade them: The reaſon of which ſeems to be, that the animal ſpirits, forasmuch as they being incited, by an heterogenious *Copula*, in the whole nervous kinde, become fierce, and altogether unbridled, which ſo to exerciſe, and tire out, there is need, both that they themſelves may be tamed, and that the exploſive *Copula*, may be ſhaken off.

Univerſall Convulſions from Witchcraft.

That Convulſive diſtempers are ſometimes excited by witch-craft, is both commonly believed, and uſually affirmed, by many Authors worthy of credit: and indeed, as we do grant, that very oftentimes, moſt admirable paſſions, are produced in the humane body, by the deluſions of the Devill, foraſmuch as he, to cauſe wonders, by which he might rule, by the ſubtletie of working, inſinuates to the ſenſitive ſoul, or the conſtitution of the animal ſpirits, heterogeneous Atoms, or little Bodies, and ſo adds now ſpurs or pricking forward, and now caſts chains on its functions, and now carries them to miſchief: alſo by ſome means he enters himſelf into the humane body, and as it were another more mighty ſoul, is ſtretched thorow it, actuates all the parts, and members, inſpires them with an unwonted force, and governs them at his pleaſure, and incites to the perpetrating of moſt cruel, and ſupernatural wickedneſſes: yet all kinde of Convulſions, which beſides the common manner of this diſeaſe, appear prodigious, ought not preſently to be attributed to the inchantments of Witches, nor is the Devill preſently or allways to be brought upon the ſtage. For indeed, as often as a childe, or relation, of ſome man of the richer ſort, is by chance taken with moſt cruell, and unuſuall Convulſions, for the moſt part, it falls out, that by and by the next old woman is accuſed of witchcraft, ſhe is made guilty, and very hardly, or not at all, the wretch eſcapes the flames, or an halter; when in the mean time, the diſeaſe, proceeding from cauſes meerly natural, may be eaſily Cured, by no other Exorciſm, than Remedies uſually preſcribed againſt convulſive diſeaſes: In truth, the animal ſpirits being indued, with a more cruell exploſive *Copula*, and being ſtrucken by it all of a heap together, obtain ſo much ſtrength, and vigour, beyond their proper and wonted power, as the flame of gunpowder, has above the burning of the common flame; ſo that thoſe, who obnoxious to this diſeaſe, out of the fit, may be govern'd, lifted up, and moved at pleaſure, with the light help

Which are commonly but falſly ſo thought.

The reaſon of them.

help of one man; when the ſame is upon them, make nothing of the utmoſt endeavours, and force, of at leaſt four of the ſtrongeſt men: But if in the caſe of any one that is ſick, there ariſe a ſuſpition of witchcraft, or faſcination, there are chiefly two kinds of Motions, that are wont to create, and cheriſh this opinion, *viz.* 1. If the patient doth perform the contortions, or geſticulations of his members, or of his whole body, after that manner, which no ſound man, nor mimick, or any tumbler can imitate. Then 2dly, If ſuch ſtrength be ſhown, that ſurpaſſes all humane force; to which, if the avoiding of monſtrous things happen, as when bundles, as *Henry van Heers* relates, are caſt forth by vomit, or a live Eel, as *Cornelius Gamma* tells, voided by ſtool, without doubt, it may be believed that the devill has, and doth perform, his parts in this Tragedy.

Which argue witchcraft.

It were eaſie to heap together, very many, and indeed admirable hiſtories, of perſons of every Age and Sex, affected after a ſtupendious and as it were ſupernatural manner, with the manifeſt ſuſpition of witchcraft: for ſuch are every where extant, among Authors, both Phyſitians, and Phyloſophers; and becauſe vulgar rumour, noyſes about diſeaſes, cauſed by witchcraft, to happen often in allmoſt every Country: but becauſe theſe kinde of caſes, are full of Impoſture, or allways increaſed, by the fictious lies of the relators, to create admiration, (and for that they rarely fall under the medicall cure) I will here purpoſely omit them: what remains is, that I proceed to unfold, the next kinde of univerſal Convulſions, to wit, which comes upon malignant, or otherwiſe irrigular, or ill-cured Feavours.

CHAPTER VIII.

Of Univerſal Convulſions, which are wont to be excited, in Malignant, ill-cured, and ſome irregular Feavours.

THat Convulſions ſometimes happen to perſons ſick of Feavours, almoſt every ordinary body underſtands, and from thence takes a remarkable Prognoſtication, of Death, or perill: For in malignant Feavours, alſo ſometimes in the ordinary ill-handled, as the *Virtego*, or *Delirium* ariſe, from the morbific matter being layd up in the Brain, from the Blood; ſo from the ſame, being ſlidden down into the nervous ſtock, Contractures and twitches of the muſcles, and tendons; alſo ſudden ſhakings of the members, and Limbs; and ſometimes moſt horrid ſtiffneſſes, in the whole Body ſucceed: The reaſon of which kinde of Symptoms ſeems to conſiſt in this, that the Liquor watering the nervous parts, abounds every where with heterogeneous particles irritating the Spirits: for by that means, the Spirits inhabiting, and influencing, being diſturbed in their juſt Influence, and emanation, are incited into continual exploſions, as it were a crackling noyſe, not much unlike, as when the flame of a Lamp, being imbued with droſſy and ſalted oyl, aſcends with a noyſe and ſparkling: which kinde of Convulſive diſtempers, for the moſt part, happen about the height of feavours, when the morbific matter, being firſt layd up in the blood, is from thence transfer'd to the Brain, and that being paſs'd thorow, and alſo infected, it is caried into the Syſtem of the nerves, and from thence ſtirs up Convulſive paſſions, with, or without a *Delirium.*

Univerſal Convulſions happning in Feavours.

The reaſon of the ſymptoms.

But indeed, it is ſometimes obſerv'd, that, beſides theſe kinde of Convulſive diſtempers, coming upon Feavours, and ſecondarily excited; in a malignant conſtitution of the air, alſo from the breath of a Peſtilent Contagion, the nervous Liquor hath been infected before the blood, or elſe apart from it, and therefore a *Delirium*, or Convulſions, have gone before a feavouriſh Diſtemper. Further, I have often obſerved, that ſome irregular Feavours have aroſe, in which the blood has been hardly ſeen to boyl up, or grow hot above meaſure, but the beginnings of this ſlow and very dangerous feavour, were layd chiefly in the nervous humour; which being by degrees brought to maturity, did induce Convulſive Diſtempers, with a *Delirium*, or madneſs, and other waſtings or exorbitances of the Animal Spirits. For the ſick never complained of heat, or thirſt, being

ſoon made feeble, and as it were ſtrengthleſs, they were preſently obnoxions to frequent giddineſs, alſo to rremblings of the Limbs, and as it were leapings forth, beſides, to twitches or jumpings of the muſcles, and tendons, and to contractures, aud pains wandring about, here and there. This kinde of ſickneſs, by ſome Phyſitians, becauſe it ſeem'd to conſiſt in the ſolid parts, rather than in the blood, is called a *malignant hectick feavour*; when indeed, the ſame being fixed chiefly in the nervous humour, may be better called, the *Convulſive nervous Peſtilence*.

A deſcription of a convulſive diſeaſe of Haſſia, *ſometimes epidemicall.*

There is mention made, by *Gregory Horſtius*, of a *Convulſive*, and *malignant Diſeaſe*, which was ſometime paſt *Epidemical*, in *Haſſia*, *Weſtphalia*, and the neighbouring Countrys: they being taken therewith, without a feavouriſh heat, immoderate efferveſcency of blood, whilſt they were imployed about their familiar occaſions, hardly perceiving themſelves to be ſick, were wont to have about their hands, or feet, and ſometimes in both, a ſenſe of tingling, with a numbneſs, running up and down: then by and by, their fingers, together with their Arms, and thighs, were now ſtrictly drawn together, now moſt ſtrongly ſtretched forth, as if they were frozen. Thoſe kinde of Contractions, and extentions, rendred themſelves by turns, and then changed places, that now the diſtemper reſided in one part, then preſently in another: But (as it often hapned) if the Diſeaſe, at once invaded the whole Brain, Univerſal Convulſions, and oftentimes epileptical Fits, infeſted the ſick: beſides, thoſe labouring with it, were obnoxious at ſome turns, to a *Delirium*, *madneſs*, and ſometimes a *Lethargie*: This ſickneſs, continued a long time, without any *Criſis*, or ſound ſolution, and could ſcarcely be ſo perfectly Cured, but that the Diſpoſition of the Brain, and nervous parts, remained evill all their Life after.

The reaſon of the ſymptoms.

As to the Reaſons of this Diſeaſe, and Symptoms, it is obvious enough, that the ſame depends altogether upon the vice, and notable depravation, of the nervous juce. That pricking, or tingling, for the moſt part, at the firſt coming of the diſeaſe, was procured for this Reaſon, becauſe that Liquor, beginning to be poyſoned, and looſned in its mixtion, by the malignant Infection, preſently it oppreſſed the animal Spirits, abounding therein, and inhibited them from their wonted, and free expanſion; wherefore, they being half overwhelmed, and conſtrained to creep, as it were among bryers, or things that catch'd hold of them, or held them back, they excited the ſenſe, as it were of tinglings running about: but then, becauſe this diſeaſe growing worſe, the nervous Liquor was yet more perverted in its *Criſis*, or diſpoſition; the heterogeneous particles, which were brought together in it, cleaving to the Spirits, cauſed them to be moved hither and thither, and to be unduly exploded; for which Reaſon, the Contractions and horrid diſtentions in the members, and the tumults, and great inordinations in the head, were raiſed up. But that in this feavour of the nerves a ſolution or difficult *Criſis*, or none at all hapned, the reaſon was, becauſe the nervous juice being ſlow, and as it were mucilaginous, and therefore heavy in its motion, was not defæcated, or cleared, as the blood, by a critical efferveſcency, nor eaſily conceived, that kinde of fermentation, by which the pure, might be ſeparated from the impure.

Indeed I have known a ſickneſs, much like to this example, to be often excited in our Country, and to invade whole families, eſpecially children, and the younger people. Some years ſince, a popular or childiſh feavour, very much infeſting the Brain, and nervous ſtock, exceedingly ſpread in this country, yea almoſt thorow all *England*: The Hiſtory of which Diſeaſe, being deſcribed in that time, in which it raged, *viz.* in the year 1661. I think it worth our pains to inſert, in this place of our Convulſive *Pathology*: For from hence, it may appear, by what means, and from what cauſes, the Convulſive Symptoms, which come upon any feavours, are wont to be excited.

A Deſcription of an Epidemical Feavour chiefly infeſtous to the Brain and nervous ſtock ſpreading in the year, 1661.

The hyſtory of an Epidemical feavour raging in the year 1661.

IN this Country, before the laſt Summer, *viz.* 1661. we had been free for above two years, from any popular diſeaſe, unleſs ſuch only as uſually come in ſome places; but then, before the Summer Solſtice, the *ſmall-Pox* (a diſtemper here rarely Epidemical) being rife in many places, raged very much: After that Summer, which was extreamly hot and dry, an Autumn moiſter then uſual followed: and after which, a moſt mild winter almoſt without any cold: in all which ſpace, the Earth was hardly covered with ſnow, or was ever hard frozen, above three or four days; ſo that within a few weeks, after the winter Solſtice, the Trees began to bud, and the vernal plants to break forth, from the boſom of the Earth, and to flower, and alſo the birds to build neſts: to this mild ſeaſon, not eventilated at the beginning of the ſpring, by the nitrous little bodys, that were wont to be blown from the North, a filthyneſs of ſhowrs, and almoſt continual wet ſucceeded. After the vernal *æquinox*, a certain irregular, and unaccuſtomed Feavour, ſeiſed upon ſome, here and there, which within a month, became ſo Epidemical, that in many places, it began to be called the *New Diſeaſe*; Raging chiefly among children, and youths; it was wont to afflict them, with a long, and as it were a Chronical Sickneſs: yea ſometimes, old men, and men of middle Age, though rarely, were ſeiſed by it, and thoſe indeed, it did ſooner, and more certainly kill. The Diſtemper at firſt invading any one, did creep on them ſo ſilently, that the beginnings of the ſickneſs, were ſcarce perceived: for ariſing without immoderate heat, or more ſharp thirſt, it induced in the whole body a great debillity, with a languiſhing of the Spirits, and a torpitude or numbneſs of the function; The Stomack was ready to loath any victuals, and to be grieved at any thing put into it, and yet not eaſie to vomit. The ſick were unfit for any motion, and only lov'd to be idle, or to ly down upon the Bed: within a ſhort time, alſo ſometime at the firſt coming of the Diſeaſe, they complained of a heavy *vertigo*, a tingling of the ears, and often of a great tumult and perturbation of the brain. Which kinde of Symptoms, were very often eſteemed, as it were the peculiar ſigne, of the approach of this Diſeaſe, if in ſome, thoſe had been wanting, or hapned to be more remiſs, inſtead of the head being affected after that manner, the diſeaſe took more deep root in the Breſt, with an excited cough, as ſhall be told by and by. But whilſt the brain, and the nervous *Appendix*, being after this manner affected, the animal Spirits, preſently from the beginning of the ſickneſs, were benummed, a ſlow and as it were hectick feavour, was inkindled throughout: but yet, the effervеſcency of the blood, which was hardly continual, but flitting, and uncertain, was according to the diſpoſition of the blood it ſelf, in ſome more intenſe, in others more remiſs; and therefore, thirſt, the white ſcurf of the Tongue, and other Symptoms, which accompany a feavouriſh diſtemper, did more or leſs infeſt them: ſweating did not willingly follow, nor could it eaſily, or by a light thing, be cauſed by Art: yea, neither this, nor any other evacuation, as it were critical, at any time ſucceeding, did ſuddenly help this diſeaſe; but it perſiſting for many weeks, and ſometimes months, reduced the ſick to the higheſt *Atrophie*, or waſting of all parts, and often infected them, with an incurable Conſumption.

Its procatartick or more remote cauſe.

The Symptoms.

About the increaſe of the diſeaſe, which hapned in moſt, within eight days, if the Diſtemper (as it was often wont) did ſettle chiefly in the head, and nervous Syſtem, moſt grievous Symtoms, in their Dominions, *viz.* a plain Phrenſie or deep ſtupidity or Inſenſibility did moleſt them. For I often obſerved, in many children, and not ſeldom in women, after ſeven or eight days from their falling ſick, that their knowledge and Speech failed them, and ſo the ſick have lain, for a long while, yea, ſometimes for the ſpace of a whole month, without any taking notice of the by-ſtanders, and with an involuntary flux of their excrements; but if they continued in ſome ſort the uſe of Judgment, and Reaſon, they laboured with a frequent *delirium*, and conſtantly with abſurd, and incongruous *Chymera's*, in their ſleep. But in Men, and others of a hotter temperament, from the morbific

bific matter, instead of a *Crisis* being translated to the brain, a Fury, or dangerous, and oftentimes deadly phrensie did succeed. But if neither Stupidity, nor great Distraction did fall upon them, swimmings in the head, Convulsive motions, with Convulsions of the members, leapings up of the *tendons*, did grievously infest them. In almost all the sick, the belly was for the most part loose, casting forth plentifully now yellow, now thin, and serous excrement, with a great stink: it was rarely that vomiting fell upon any one: The urine in the whole process of the Disease, unless when the morbifick matter, being caried more plentifully into the Brain, did threaten a phrensie) was highly red, so that some, by reason of the deep colour of the water, judg'd this feavour to have been plainly Scorbutick: which notwithstanding appeared to be otherwise, because *antiscorbutic* Remedies, (of which indeed many, and almost of every kinde were tryed) were little or nothing beneficial. It was most of all to be admired, how soon after the beginning of this Disease, the flesh of the sick consumed, and they reduced to the leanness of a *Sceleton*, when in the mean time, there was no great heat, that might by degrees consume the solid parts, nor any violent evacuation, which might greatly take them down.

Besides these evills molesting the region of the head, a distemper no less dangerous, oftentimes fell upon the breast. For in some, tho not in all, a cough very troublesome, with abundance of spitle, and thick, was excited: this hapned in some, about the declination of the disease, to wit, whilst the confines of the brain were serene, as it were the clowds sent from thence to the thorax, a great *Catarrh* suddenly rained down upon the Lungs. But in others, who especially had little infection of the disease in the head, presently after the beginning of the feavour, a cruell cough, and a stinking spitting, with a consumptive dispositon, grew upon them, and suddenly, and unthought of, precipitated the sick into a *Pthisis*: from which nevertheless, they recovered, by the timely use of Remedies, often beyond hope. It was observ'd in some, that after a long ecclips of the sensitive facultie, and oppression of the brain, from the morbific matter, at length tumors did follow, in the glandula's, neer the hinder part of the neck, out of which, being hardly ripened and broke, a thin and stinking ichor or matter, ran for a long time, and brought help. I have also seen watery pustles, excited in other parts of the body, which pass'd into hollow ulcers, and hardly curable: sometimes little spots, and *petechiales*, appeared here and there: yet I never heard, that any more broad, or blew, of these kinde, were seen in the sick. Notwithstanding, tho this feavour was not remarkable for very many malignant spots, yet it was not free from Contagion. For that in the same Family, it invaded almost all the Children, and youths successively, yea not rarely those of more ripe years, and at mens estate, who looking to the sick, were familiarly conversant in their Chambers, or about their beds, were infected with the same infection: But indeed, there was not so much cause of suspition, that for it, the friends of the sick should be wholly interdicted, from commerce with, or visiting of them.

Altho the course of this disease, (unless when it intimately settled in the brain) did appear so gentle, and continued without any horrid Symptome; yet its cure being always difficult, succeeded not under a long time: For the sick rarely grew well, within three or four weeks, yea for the most part, scarce in so many months. If this disease fell upon men of a broken Age, or strength, especially those who were before obnoxious to *cephalic* distempers, as the *Lethargie*, *Appoplexie*, or Convulsion, it oftentimes kill'd them in a short space: but if there was any hope of recovering, it could be but slowly procured, all Remedies whatsoever scarce bringing any sensible help) so that the sick, did no sooner come out of the sphear of this disease, than they fell into the confines of a Consumption.

The reason of them.

If the formal reason, and courses of this aforesaid sickness be demanded, it here easily appears, the watering Liquor of the brain, and nervous stock, for the most part both together, with the blood, to be in fault, and the immediate cause, especially of the troublesome Symptoms: to wit, forasmuch as this water, presently after the first assault of the disease, was grown more poor then usuall, and as it were lifeless; therefore a Languishing, and enervation, with a *spontaneous* wearinesse, and impotency to motion, hapned in the whole body, and with a sudden wasting of the body, in the sick. Further, forasmuch as the same Liquor, was stuffed with heterogeneous particles; *viz.* partly narcotick, partly explosive,

therefore

therefore, a numbneſs, a ſenſe of pricking, leapings up of the tendons and muſcles, and contractures, alſo the *Virtego*, giddineſſe, and other more grievous Cephalick diſtempers did ariſe: Moreover, foraſmuch as by reaſon of the evil of the nervous juice, being not quickly or hardly to be mended, the cure or healing of the diſeaſe, became ſo hard, and lingring. But for that the fault of this *Latex*, neceſſarily depended on the diſcraſie or evill diſpoſition of the blood, alſo of the depraved conſtitution of the brain, what their morbid diſpoſitions were, and by what means they brought forth the beginning, or tinder of the Symptom of the feavour but now deſcribed, let us now ſee.

As to the former, it ſeems, that at this ſeaſon, by reaſon of the hot and humi'd conſtitution of the year, and no blaſt from the north (the little bodies of which imbue the blood, and juices of our body, as it were with a nitrous ſeaſoning, and by agitating them, defend them againſt putrefaction) the blood in moſt men, and chiefly in children, youths, and women, became like ſtanding-water, that ſo contracts a ſetling, very impure, ſtuff't with heterogeneous particles, and turning to a clammyneſs, and watriſhneſs; in which, the more pure ſpirit and ſulphur, being ſomewhat depreſs'd, the watery particles, being carried forth with the impure ſalt and ſulphur, were too much exalted. Wherefore the blood, both by reaſon of its *Criſis* or conſtitution, being vitiated, alſo by reaſon of heterogeneous particles, being heaped up more plentifully in its boſome, was made more fit, either of its own accord, or occaſionally, or becauſe of the contagion, to receive a feavouriſh Effervescency, ſo that from thence, very many fell at this time into feavours. But the blood growing hot, from the feavouriſh taint being received, did not preſently burn with an open flame, but like green wood laid on the fire, with a flame as it were ſuppreſſed, and much incumbred with ſmoke. Wherefore, the morbific matter, being heaped within its maſs, was not wont, (as in a regular feavour) to be conſumed by the burning, and its reliques, at the ſet time, to be exterminated by the *Criſis*: but yet, a little after the beginning of the feavour, a great portion of this matter being powred into the head, or *Thorax*, or into both at once, and afterwards being continually ſupplied in thoſe parts, it induced either the aforeſaid diſtempers of the brain, and nervous ſtock, or a cough, with a conſumptive diſpoſition, or both together, and for this reaſon, about the beginning of this diſeaſe, when a pulſe quicker than it ought to be, and a high colour'd urine, and full of contents, did ſhow the blood to grow hot with a feavouriſh diſtemper, the ſick did not complain of heat, or thirſt; becauſe the blood growing hot, did lay up its impurities, and recrements, forthwith into the proviſion of the nervous Liquor, or into the Lungs; wherefore, within theſe receptacles, the Symptoms preſently became worſe; but afterwards the diſeaſe growing on, a ſomewhat ſharp heat, with ſcurfneſs of the tongue, was wont to be troubleſome to ſome: yea, in all, a ſlow, and as it were hectick feavour, continued throughout; which neither by ſweat, nor by inſenſible tranſpiration, could be ſo wholly removed, but that it was daily renued, chiefly after eating, tho never ſo ſmall: which thing truly ſeem'd to happen, becauſe the nervous juice being full of the feculencies, brought from the blood, did not afterwards receive them in ſo great plenty, but that theſe recrements, together with the nutritious humour, (and for that this was not conſumed by nouriſhing the ſolid particles) remaining within the bloody maſs, cauſed it then to grow feavouriſhly hot.

2ly, Beſides this morbid diſpoſition of the blood, contracted from the intemperance of the year, it ſeems, that the brain alſo, from the ſame occaſion, was made prone to the aforeſaid paſſions. For when, for a long tract of time, the ſouthern winds did continually blow, with a moiſt conſtitution of the Air; from thence, the paſſages, and pores of the brain, being very much looſned, and opened, and its connexion too much diſſolved, they gave an eaſie paſſage, to ſerous humours, and for all ſorts of heterogeneous particles: wherefore the blood being very feculent, and watery, as ſoon as it began to grow hot from the feavour, carried its ſerous recrements and filths, preſently thorow the too open doors into the head: for whoſoever he was, who did not complain of his head, being too much ſtuffed with a moiſt air, and numbneſs of ſpirits; on the contrary, his pores being bound together, by an intenſe cold, or dryer air, all his ſenſes, and faculties, remained more quick and lively.

Theſe things being thus premiſed, concerning the morbid proviſion of the brain, and humours, to wit, of the blood, and nervous humour, by reaſon of the conſtitution of the year, whereby indeed, very many at that time, fell into a flow, unequal, and long continuing feavour, ſurrounded with *Cephalick* and *Convulſive* ſymptoms, and hardly curable: hence alſo it will be eaſie, to unfold the reaſons, of the reſt of the ſymptoms and accidents, chiefly to be noted in this diſeaſe.

Why this diſeaſe chiefly invaded children, women, and phlegmatick men.

For firſt of all, that this irregular Feavour, raged chiefly among Children, young men, women, and phlegmatick men, the reaſon was, becauſe in thoſe kinde of bodies, the blood was apt to be more wateriſh, and leſs perſpicable, and from thence to gather a ſerous *Colluvies*, or watry humour, and heterogeneous feculencies; and alſo, the brain being more humid and weak, eaſily received any recrements of the bloud. Wherefore it may be obſerved, that thoſe ſort of perſons, were found more prone to Convulſions, ariſing by reaſon of any other occaſions.

The reaſon of the Atrophie coming upon this feavour.

Secondly, the noted *Atrophie* or leanneſs, came ſo ſuddenly upon this feavour, becauſe, by reaſon of the depravation of the nervous juice, the officies of nouriſhment, depending upon it (which, as we have elſewhere ſhown, are highly active) preſently failed. For although we do not grant, the nervous humour to be only nutritious, but to diſpenſe thorow the Arteries, a matter deſtinated to the nouriſhable parts, prepared in the bloody maſs; yet it may be lawfull to think, that the Liquor watering the brain and nervous ſtock, by means of an efficient cauſe, doth conduce very much to alimentation; for this growing turgid with animal ſpirit, actuates and invigorates the nutritious juice, brought to every part by the blood, and admitting it into the paſſages, and moſt intimate receptacles of the body to be nouriſhed, and as it were leading it in, aſſimilates or reſembles it, Wherefore, when this houſhold Liquor is ſo depraved, that it doth not rightly ſupply the animal ſpirits, requiſite about the work of nutrition, all the members and parts of the ſtomach vitiated in its tone, either ſpues back whatſoever nouriſhment is brought, or cannot receive it to its proper uſe: wherefore truly in this diſeaſe, the bulk or habit of the body, however fuller or fatter, was more ſooner pull'd down, then in a continuall Feavour, where it might much more evaporate, by the intenſe heat, or copious ſweats. The reaſon of which is, becauſe in a burning feavour, altho the blood growing very hot, exhales more plentifully; yet in the mean time, it continually affords ſomething of nouriſhment, which the ſeverall parts, help'd by the benefit of the nervous juice, eaſily received, and aſſimilated; but in this nervous peſtilence, altho the nutritive matter was ſufficiently provided, yet by the defect of the Nouriſhment of the ſpirits, the nouriſhment was altogether inhibited.

Why this feavour was hardly cureable.

3. For the aforeſaid reaſons alſo, this feavour, being a long while protracted, was wont ſcarce ever to be critically helped, and difficultly cured, by the help of allmoſt any medicines: For the feavouriſh matter, creeping preſently, from the beginning of the diſeaſe, into the nervous Liquor, could hardly afterwards, and not but of a long time, be exterminated from its boſome: for that this water, with a flow motion, and flowing leaſurely in the ſtreight veſſells, does not as the blood, conceive of its own accord a purifying effervеſcency, or fermentation; neither can the forces of medicines, reach to it ſo eaſily, and unmixed: but either they are firſt hindred by other parts, or becauſe they are heterogeneous, they are wholly excluded from the brain, caſting back whatever is incongruous. In truth for this reaſon, all diſtempers of the brain and nerves, as it were making a mock at Medicines, are moſt difficulty cured. Therefore in this feavour, if the evill impreſſed on the brain and nervous ſtock was taken away, either a cruell cough with plentifull ſpitting, ot tumours, or an Impoſtum in the neck did follow: to wit, the morbifick matter being ſupped back, by the blood, and again depoſited, ſetled either in the *Thorax*, or in the Glandula's, and emunctories, nigh the hinder part of the neck. But this diſeaſe, was the more contumacious, becauſe the diſcraſie or evill conſtitution of the blood, was not eaſily mended: for altho from the beginning, its *Latex*, the recrements being poured forth, even into the nervous Liquor, grew but little and ſluggiſhly hot; yet afterwards, theſe receptacles being filled, and the morbific feculencies, and beſides the nutritious matter, not imployed in nouriſhing the parts, being reſident even in the blood, did aggravate it, and for the excluon of this trouble, not to be mixed with it,

did

did induce an Effervescency, such as is wont to be in an hectick feavour, either almost continuall, or presently apt to come again. For I have often observed in this feavour, from grewell, barly-broth, and other slender diet; no less ebulition of the blood to be stirred up, than from broth made of flesh: whether indeed the nourishing juice, supplying the blood from the chyle, because it was not imployed in the work of nutrition, carried something heterogeneous, and not rightly miscible, as a trouble to the blood; and by reason of the particles of this superfluous juice, being copiously sent away with the *serum*, the urine became very thick, red, and very full of contents: Also, for the same reason, the belly was for the most part loose, forasmuch as the blood, filled full of the nutritious juice, did suck forth a lesser portion of the chile from the bowells, and did pour back again part of that which had been brought to it, on the intestines; the feavourish distemper did likewise stick so long in the blood, because, till the animal regiment being restored, nutrition was rightly performed, that superfluous matter was carried into the mass of blood.

We deliver the example, and the *Ætiology* or rational account of this aforesaid feavour, more largely for this reason, because the same disease, did fall upon our Countrey men, here and there also at other times: for that of late, in this City, all the younger people of a certain family, were sick of it: yea, I remember, that some time past, very many laboured with such a feavour; Out of the many histories and examples of sick people, which it rendred when it was epidemical, I will here propose one or two.

1. *Observation.* A strong and lively young man, about the beginning of the spring, 1661, falling sick, without any evident cause, without any great heat or thirst, he became suddenly weak, and as if enervated, with a dejected appetite, and languor of spirits: *Cathartick Remedies*, *Antipyretics* or allaying of heat, digestives, and also antiscorbuticks, and others of various kindes, administred by the prescriptions of the most famous Physitians, availed nothing: But notwithstanding the sick man, hitherto languishing with a slow and wandring feavour, with a quick and feeble pulse, a deep-colour'd urine, had kept his bed a fortnight; besides, being reduced to the greatest leanness, he complained of a giddiness, and as it were the fluctuation of a sound in his head, and a tingling noyse in his ears. Altho he was troubled with a great stupor, yet his sleeps were mightily troubled, and broken with delirious fables. After four days, when the feavour was not yet declined, it was thought good to take away four or five ounces of blood, by Leeches, from the sedal veins; from hence the feavour began to be much exasperated, for a great intense heat, with thirst, watchings, and almost continual tossing of the body, also the tongue dry, and scurfy, appeared; then quickly a troublesome cough, with abundance of discoloured spittle followed, to him were administred, *almond*, and *barly-drinks*, with temperate bechicks (or things to stop coughing) boyled in them; water of milk distill'd with *snails*, and pectoral herbs, the shelly-powders, prepared nitre, and often Cordial opiats; which notwithstanding scarce giving any help, the sick man still became more weak: when in this manner being sick above two months space, the feavourish distemperature, and cough also, dayly growing worse, he seemed near death, at length a voluntary sweating arising, so that every night, or every other night, he sweat abundantly, and from thence finding himself better, using then the aforesaid Remedies, he grew well within six weeks.

Till I had seen many sick people after the same manner, I suspected this disease to be alltogether an hectick feavour, with a consumptive disposition of the Lungs; but when I saw many others at that time fall sick ordinarily, after the like manner, I easily instituted the *Ætiologie* or national account of this feavour, such as I have already described: to wit, that the blood, because of the intemperature of the year, and perhaps from errors in dyet, had contracted a vitious *procatarxis* or remote cause: Then it growing feavourishly hot, and presently carrying its impurities to the brain, and so depraving the juice, watering it, and the nervous stock, induced the vertiginous distempers, with a *stupor*, a languishing of spirits, and an *atrophy* of the whole body: but so long as the blood did transfer its recrements, from its own bosom, into the brain and nervous *appendix*, the feavourish heat continued more gentle and milde: But afterwards, when the tending downwards of the morbific matter, by the opening of the hemorhoid veins, was drawn away

The reason of it.

away from the brain, the lame being firſt retained within the bloody maſs, increaſed the feavour; then being poured on the Lungs, excited the cruel cough, with plentifull ſpittle: but foraſmuch as the fleſh of the Lungs remained free ftom putrefaction, as ſoon as the ſerous water was ſent away by a more plentifull ſweating, the ſick man became free, both from the feavour, and *phthiſis* or Conſumption, that ſeemed ſo deplorable.

2. Obſervation. In the mean time, whilſt he lay ſick, I viſited another, about 12. years of age, after the like manner affected. But this when I was firſt ſent for, having been ſick above a month, was reduced to the leanneſs of a Skelliton: beſides, he was troubled with a *vertigo*, with a noiſe in his ears, and deafneſs, and alſo with a violent cough, with yellow, and as it were conſumptive ſpittle: his pulſe was quick and feeble, his urine red and thick, his appetite much dejected, his ſpirits ſo languid, and his ſtrength ſo caſt down, that he could not keep out of his bed: I gave this youth to drink often in a day, water diſtill'd from milk, with ſnails and temperate herbs: beſides I ordered him an open decoction, ſuch as is in uſe for the Rickets, to be daily taken inſtead of his ordinary drink: by the help of which Remedies, he was reſtored to his health, in a months ſpace. At this time I was ſent for to many other people, of every age and ſex, diſtemper'd by the ſame diſeaſe, now clearly Epidemical; for it, running thorow whole families not only in this City, and the neighbouring parts, but in the Countries at a great diſtance, as I heard from Phyſitians dwelling in other places, increaſed very much. Thoſe for the moſt part labouring with this feavour, ſo be they were otherwiſe whole, grew well, by the fit uſe, and order, of medicine and dyet: but it hapned very often but ill to thoſe, who were indued with a weakly conſtitution of brain, and nervous ſtock, or broken with age; but not ſeldom the caſe of the ſick became dangerous becauſe the Phyſitians were not wont to be ſent for preſently after the beginning of the diſeaſe, yea, ſcarcely before it had more deeply ſpread abroad its roots, and the opportunity of healing was paſt.

3. Obſervation. For that reaſon, this feavour became very deadly, in the family of a certain Noble man, among his children, originally obnoxious to Cephalic diſtempers. About the vernal Æquinox, a Boy of about eleven years of Age, began to be ſick: At firſt without any vehement heat, or thirſt, a dejection of appetite, and want of ſtrength came upon him: Beſides, an almoſt continual giddineſs did trouble him, with a frequent danger of fainting, that he often thought he was juſt dying. By the advice of a certain woman attending him, they dayly gave him Cliſters: then, when from the foulneſs of the mouth, and Tongue, manifeſt ſignes of a Feavour appeared, this Emperick on the fifth day, gave him a vomit of the Infuſion of *Crocus metallorum*, and on the ſeaventh day a Cordial powder being adminiſtred, ſhe incited the ſick youth covered with blankets to ſweat: his skin hardly began to be moiſt: but preſently he began to talk idly, complained that his Cap was fallen into the water, by and by becoming ſpeechleſs, within four hours, whilſt I was ſent for, he expir'd before I came.

4. Obſervation. A little while after, the ſame diſeaſe fell upon his yonger Siſter: whoſe ſickneſs however, becauſe it was accompanied with a frequent and humid Cough, was thought at firſt to be only a taking of Cold; but within a few days, this Cough became plainly Convulſive: ſo that, whilſt ſhe Cough'd, the *Diaphragma* being caried upward, and with a renewed *Siſtole*, held ſo a long time, ſhe made a great noiſe as if about to be ſuffocated: then this little maid growing more apparently feavouriſh, complained of thirſt and heat, and lay all night without ſleep, with a mighty agitation of her body, and began to talk idly, after the ſame manner as her brother, of her coat being fallen into the water; and when all things grew worſe, ſhe began to be tormented with Convulſive motions, firſt in her Limbs, by and by in her face, and then in her whole body: the *Paroxyſms* coming by often turns, twice or thrice in an hour, did moſt grievouſly trouble her, ſo that this little wretch, within the ſpace of 24. hours, after the Convulſive Diſtempers began to grow more grievous, her animal ſpirits being almoſt quite ſpent, ſhe dyed; whilſt the Convulſive Fits tormented her, her pulſe was very much diſorder'd, and often intermitting, alſo a frequent vomiting moleſted her. Being ſent for to viſit this maid, alſo too late, a little before her death; when I could contribute nothing to the proroguing of Life, I endeavourd what I could, to finde out from her Death, the knowledge of the aforeſaid diſeaſe, therefore having

got leave to diſſect her body, the reaſons, and marks of the Symptoms chiefly urging, in this feavour, more clearly appear'd.

The kn wledg of the diſeaſe found out by diſſecting the Carcaſe.

Opening therefore firſt the lower belly, I found all the bowells in it ſound enough, and well furniſh't: The *ventricle*, altho tyred with empty vomiting, contained nothing beſides the Liquor, lately taken in at the mouth: for neither in it, nor in its *Appendix*, were worms, or ſharp humours found, which are wont oftentimes to give a cauſe to theſe kinde of Convulſions: the ſmall guts, were in many places mutually involved: to wit, the *Convex ſuperficies* of one part, was thruſt into the concave of another, as into a ſheath, and hid far in it, which indeed I judge to have hapned, wholly from the convulſive Motions of thoſe bowels: for whilſt by reaſon of the vehement Convulſion, excited from the nervous *origine*, the oppoſite *fibres* being drawn together, did work the ſame Inteſtine, into contrary motions, it eaſily hapned that a part of the Inteſtine of the *Ilion* being carried upward, might run into the hollowneſs of the other, being ſnatch'd downward.

The *Thorax* being opened, the fleſh of the Lungs appeared very red, and as it were ſprinkled with bood, yea in ſome places as it were livid, and almoſt black: out of the ſame whereever it was cut, there flow'd forrh a thin and frothy matter. Certainly this ſhew'd, that the feavouriſh matter, or the ſerous impurities of the boyling blood, being ſoon impacted in the Lungs, did ſo ſtuff up their pores and paſſages, that the blood it ſelf, being in its wonted and free Circulation, there ſtagnating, and being extravaſated, did excite a certain Inflammation.

We found a no leſs clear track, of this ſo deadly diſeaſe in the head: for the ſhell of the skull being removed, preſently the veſſells, creeping thorow the *meninga*, were ſeen to ſwell very much with blood, as if almoſt the whole maſs of blood, were gathered together in the head: for the veins being cut or broken, about the Inwards of the lower and middle belly, little blood flowed forth: Beſides, thoſe membranes where they cloath the *Cerebel*, and being higher ſpread divide it from the brain, being ſprinkled in very many places with extravaſated blood, were noted to be of a black-purple colour; that it was not to be doubted, but the *Phlegoſis* or Inflamation round about excited, was the cauſe of the ſo cruelly infeſting Convulſions. Theſe coverings being taken away, the ſubſtance of the brain was ſeen to be altogether moiſt, and watered above meaſure with a watery humour: yea, its rine or bark being taken off, all the *ventricles* were full of a limpid or clear water, of which kinde of very clear Liquor, there was judg'd to be more then half a pinte.

The Pathologie of the aforeſaid Feavour.

From theſe appearances, the *Pathologie* of the aforeſaid feavour is eaſily Collected: to wit, in this ſickneſſe, as alſo in many others, the blood feavouriſhly growing hot, preſently depoſes its recrements, both into the Lungs, and into the brain; wherefore a ſerous Colluvies, or watery heap, did preſently overflow the conſtitution of either; then, becauſe the blood being hindred, both here and there, from its due circulation, it began to grow into a very great heap, about the confines of the affected parts, and at length to ſtagnate, and to cauſe as it were a *phlegoſis* or Inflammation: hence, by reaſon of the *ſerum* being plentifully heaped up in the lungs, and baked by the heat, the troubleſome cough, with the thick and diſcoloured ſpittle, for the moſt part came in this diſeaſe; and by reaſon of the like affection, excited within the head, the *vertigo*, ſwimming, ſtupifaction, and other *Cephalic* paſſions, conſtantly ſeaſed on the ſick: which kinde of Diſtempers, in this little maid, and in her brother, by reaſon of the infirm conſtitution of the brain, before in either of them, being made more greivous, terminated in an *Apoplexy*. I might eaſily here propoſe many other hiſtories, of perſons ſick of this feavour at that time, but from theſe but now recited, the Type of the aforeſaid diſeaſe, may be ſufficiently known: But becauſe the ſame feavour happens almoſt every year, on ſome præ-diſpoſed; and perhaps, by reaſon of an evill conſtitution of the year, may hereafter at ſome time become *Epidemical*, it will be worth the while, to repreſent ſome Method about its Cure.

The Curatory Method.

Concerning which, firſt of all take notice, that in this feavour, no Critical days were to be obſerved, as in the vulgar continual feavours: for the blood as ſoon as it began to grow hot, poured out a part of the morbific matter, as yet crude, and not overcome, from its embrace to the head or breaſt: wherefore it were vain to expect that the blood ſhould ſuffer the heterogeneous particles to be

heaped together, in its mass to a fullness; that from thence a flowring or putting forth arising, at the set intervalls of times, it might thrust the same subtilities out of doors: yea rather this growing hot glows not with a great, and open burning: but like a fire covered over with chips, sends forth a moist smoke or breath, rather then a flame: But so, that from thence, by reason of the nervous juice being depraved soon in its disposition, and not rarely, becausе of the lungs being stuffed with the consumptive matter, the convulsive, or phthifical or consumptive symptoms, did molest chiefly, in the whole course of the disease.

Blood to be taken away at the beginning of the disease.

It behoves us to designe the curative Intentions, according to the various times of the disease, and the diversities of the symptoms chiefly urging. About the beginning of this feavour, the taking away of blood, seem'd convenient allmost to all: This kinde of remedy, I often experienced with success, in little Children: For that by the means, as it were another breathing place is opened, to the mass of blood, silently and covertly growing hot, and obtruding its soot or smoak, on the more noble parts; and for that reason, its impure effloreſcencies or puttings forth, are drawn away from the brain, and lungs. Therefore, although this feavour of an ill Condition, may be accounted as it were malignant, yet forasmuch as the blood is not presently apt to be coagulated, but to be too much poured forth, and to bestow its serosities on the nobler parts, to wit, the brain and lungs; therefore *Phlebotomy*, so it be administred in the beginning of the disease, is convenient allmost to all.

For the same reason, *Cathartick* Medicines, and chiefly vomitory, are administred at the very beginning of the disease; for these do not only evacuate the *viscera* of concoction, and so draw away the chief fomenting of the disease, and as it were its originall, but besides, they draw forth the serosities from the blood, and so effect its cleansing, rather in the stomach and Intestines, then in the head and lungs. Further by Emeticks, for that the receiving *Glandulaes* of the *Lymphe-ducts*, are pulled with a great shaking, the superfluities of the nervous juice, least they should evilly affect the brain, and its dependencies, are expressed forth into the lower bowells: also for this end, the belly is to be kept continually loose, by the use of Clysters. But in the mean time, whilst the blood being infected with the taint of this disease, threatens the brain or *præcordia*, with the evill, it will not be safe to attempt any thing with *Diaphoreticks*, or sweating medicines, or *Diureticks* or such as evacuate by urine, or also with *Cathartick*s, vomiting and purging medicines: For these kinde of medicines, forasmuch as they greatly pour out the blood, and compell its serosities into more open issuings forth, all the recrements, being apt to fall away from the mass of the blood, are easily obtruded on the brain, or Lungs, when they are of a more feeble constitution: So in the youth above-mentioned, a loss of speech, came upon the raising of an untimely sweat: Also I have known, that *Sudorificks*, no other then chaly beats, in the morbid disposition of the lungs, have brought on a waisting or Consumption.

Vomits and Purges, are to be administred.

Phlebotomy therefore, and if need be vomiting, or purging, either one or other, or both, being to be made use of at the very beginning of the disease, the other Intentions shall be, to draw away the morbific serosities of the blood, apt to flow forth on the head or breast, and to derive them gently by other ways of evacuation, and to put them forth of doors. To this end, *Vesicatories* or blistering plaisters, ought to be applyed, to the nape of the neck, or *Parotida* or *jugular Arteries*, or to the Arm-pits, or the Groin, or about the thighs, or calves of the legs, sometimes in this part, sometimes in that; to wit, that the little Ulcers being here and there excited, and continually running, might plentifully pour forth the *serum*, imbued with the morbid, and heterogeneous particles.

Blistering plaisters.

Diureticks.

But Remedies, gently carrying the *serum*, into the Reins, and urinary passages, are most often administred with succeſs: For this business, *diuretical Apozems*, and Julaps, are to be ordained after the following forms.

A diuretick Apozem.

Take of the Roots of *Scorzonera*, *cherfoil*, *grass*, and of *Eryngoes* candied each ℥ vi. 1. *Apple* cut, of the leaves of *pimpinell*, *meadow-sweet*, each i. handfull, of *Raysons of the Sun*, ℈ i ß. of *harts-horn*, burnt ℥ ii. being cut and bruised, let them be boyled on a clear fire, in four pints of spring water, to the Consumption of the third part; to the straining being cleared ii. pints, add of the *Syrrop* of *green Cytorns*, or *violets* ℥ ii. of *sal prunella* ℥ i ß. make an *Apozem*. The dose ℥ iiii. to vi. thrice in a day.

Or

Or into that ſtrayning, put 15 *blanched ſweet Almonds*, and of the four cold ſeeds, each ʒ i. being bruiſed, make an Emulſion according to Art. *An Emulſion*

Take water of *Dragons*, and of *black-Cherries* each ℥ iiii. of *ſcordium* compound ʒ ii. of *Threacle* water ℥ i ß. of *ſyrrop of Clove-gilliflowers*, ℥ ii. of the ſpirit of *vitriol* xii. drops, make a Julap. *Julap.*

Take oftentimes in a day, in ſmall beer or poſſet-drink, half a dram, or ii. ſcruples of *ſal-prunella*. *A Power.*

Beſides, in this feavour, medicines gently ſweating, of that ſort chiefly, which reſtores the animal ſpirits, and defends them from any heterogeneous *Copula*, are of very great uſe: wnerefore, either the *powder of pearls*, or the *ſpirit of harts horn*, or of *blood*, in a moderate doſe, are adminiſtred twice in a day, *viz.* Morning and Evening. *Gentle Diaphoreticks.*

Clyſters are to be given almoſt every day, and if it be thought fit, a gently looſning *purge*, may be taken once or twice in a week. *Gliſters.*

The dyet preſcribed ought to be ſlender, as in other feavours, let them be wholly interdicted from fleſh, or broath made thereof, only let the ſick feed on Grewell, or barly-broth, and let their drink be ſmall beer or poſſet-drink. *Dyet.*

If that notwithſtanding, any preventive phyſick, the morbific matter, ſhould lodge in the brain, or Lungs, or both together, ſo that a diſſolution, or inordination of the animal function, or alſo a violent cough, ſhould aſſalt them, it muſt be conſider'd, what is to be done in either ſtate of the diſeaſe, carried forth after this manner, into an evill condition; but then the curative Indications ought to reſpect the ſtupor, or madneſs, or cough: and laſtly, if in the declination of the diſeaſe, theſe ſymptoms do remit, proper Remedies are to be adhibited, againſt the *Atrophie*, as it were the laſt fortreſs of this Feavour.

1ſt. Therefore if the morbifick matter, as it is often wont, being brought to the brain, ſhould bring in an Inſenſibleneſs, or a ſoporiferous or ſleepy diſtemper, remedies drawing it another way, and deriving it ſome way from the head, and beſides ſuch as ſtir up the animal ſpirits, and take away the impure *Copula* ought carefully to be adminiſtred, wherefore in this caſe, the uſe of Epiſpaſticks or ſuch things that draw the water outwardly, ſhould be much increaſed, and let the *ſpirit of Harts-horn*, be exhibited allmoſt every ſixth hour, in a little bigger doſe, let blood be alſo taken, by the ſucking of Leeches, more largely from the jugular veins, the *Salvatella*, or the ſedal veins. If the diſtemper remits not, the head being ſhaven, let *Emollient fomentations* be often applyed thereto: Further, let *Cupping-Glaſſes*, *Flaiſters*, and *Cataplaſms*, be laid to the ſoals of the feet, and other means of Adminiſtrations, ſuch as are commonly preſcribed for the curing of the ſtupor, or Inſenſibleneſs, ought to be uſed: In like manner, if on the evill, or no *Criſis* of this feavour, a phrenſie, or madneſs ſhould come, remedies appropriate to thoſe diſtempers, are made uſe of. *The Curatory Method in the unſenſibleneſs and madneſs.*

2dly, But if either with, or without this ſort of diſpleaſure, brought to the head, the Lungs alſo have taken the evill of this diſeaſe, ſo that the ſick, not yet free from the feavour, ſeem to fall into a waiſting, or Conſumption, with a troubleſome cough, with abundance of thick, and often diſcoloured ſpittle; Medicines commonly preſcribed for ſuch kinde of Diſtempers, are convenient enough; wherefore, pectoral Decoctions, Electuaries, ſyrrops, diſtill'd waters of milk and ſnails, and other remedies of the like nature, ought diligently to be made uſe of; the forms of which may be found, in the before-deſcribed Caſes. *In the Cough.*

Thus far we have deſcribed the continual feavonr, for the moſt part convulſive, and ariſing no leſs from the fault of the nervous juice, then of the blood: I will here further propoſe an example of a diſeaſe, having the likeneſs of an intermitting feavour, but radicated chiefly in the nervous juice; the nature of which kinde of diſtemper, for that it is very rare, and truly pertinent to our convulſive *Pathologie*, will appear from the following hiſtory.

A noted Woman very young, and indued with a more weak conſtitution of brain, aud nervous ſtock, and for that cauſe very obnoxious to convulſive diſtempers, after ſhe had conceived with child, about the fourth month of her being big, from cold being taken, ſhe was grievouſly afflicted with Aſtmatical fits, and beſides, with a frequent ſinking down of her ſpirits: but by the uſe of remedies, indued with a volatile ſalt, ſhe grew well, within a fortnights ſpace, but after that, about 14. days, an unwonted and truly admirable diſtemper, fell upon this Gentlewoman. *A very rare Obſervation.*

One morning, awaking after an unquiet sleep that night, she felt a light shivering in all her body, as if she had had the fit of an Ague: frequent yaunings, and reatchings, with an endeavour to vomit followed thereupon: then her urine, which was but now of a citron colour, and of a laudable substance, became pale, and waterish, and was rendred at every turn, to wit, almost every minute of an hour: moreover, about her loins, and *hypochondria*, and in other places, pains with light Convulsions, running about here and there, were excited: which kinde of symptoms plainly convulsive, with her frequent making of a lympid urine, continued in the Morning allmost to Evening, in which space of time, a great quantity of water, at least three times more then the liquor she had taken, was rendred; in the mean time, neither was the heat great, nor did thirst trouble her, nor was her pulse encreased: In the evening the aforesaid distempers ceased, and her urine became citron colour, and moderate; and besides, all night she enjoy'd a moderate sleep, then the morning following, about the same hour, the fit returned, accompanied altogether with the like symtoms, and so dayly acted the same Tragedy.

The reason of it. Visiting this Gentlewoman, after she had been sick in this manner for 12. days, I framed the Ætiologie of the aforesaid case, to wit, that this disease, chiefly radical in the nervous stock, did depend upon the effervescency, and flux of the humour, watering the nervous parts: For it might be suspected, that this water being diffused from the blood, made degenerate by reason of the suppression of her Terms, upon the brain, and nervous stock, became more sharp, and serous than it ought to be, and for that cause incongruous to the containing parts: wherefore, being gathered together to a plenitude, by the nights sleep, it did stir them up, or provoke them, for the expulsion of it, every where into wrinklings, and contractions: hence shiverings, yaunings, streachings, and wandring pains, were excited in the whole body: Furthermore, from the sollid parts, after this manner contracted, and shaken, not only the nervous Liquor, but also the nutricious, every where laid up in the sollid parts, but not truly assimilated, were shaken off: and then, either *Latex*, being exterminated from its receptacles, and received by the veins, or Lymphaducts, or water-carrying vessells, was render'd to the Mass of blood: from whose bosome, before it had acquired a lixiviall tincture from it, being at last cast forth by the reins, constituted a clear, and Copious urine: But that this distemper observed such exact periods, the reason is, because the nervous water, being supplyed with an equall dimension, did arise to a fulness of running over, dayly at the set time: Therefore also, the urine appeared concocted, and yellow, before and after the fit, because then its matter consisted only from the *serum* of the blood: Afterwards, during the convulsive fit, the limpid humour being shaken off, from the solid and nervous parts, and passing quickly thorow the blood, adulterated the colour and the quantity of the urine. I prescribed to this big-bellied woman, Phlebotomie, and besides, a powder composed out of *Corall*, *pearls*, *ivory*, and other *Cardiacks*, to be taken thrice in a day, in a proper Liquor; morning and evening she took of the *tincture of Antimony*, 12. drops (whose singular effect in the too great flux of urine, I have many times experienced): By the use of these, all the symptoms ceased, in a short time.

CHAPTER IX.

Of Universal Convulsions, which are wont to be excited, because of the Scorbutic disposition of the Nervous juice.

Universal Convulsions by reason of the Scorbutic disposition of the nervous juice. THus much concerning universal Convulsions, diffused thorow the whole nervous kinde, which come upon feavours; and especially concerning the Convulsions, which are wont to be excited, in the commonly called *malignant hectick Feavour*. There yet remains (which was proposed in the third place) for us to shew, by what means, and from what causes, universal Convulsions are induced, without

without poyſon or feavouriſh infection, by reaſon of the ſcorbutick, or otherwiſe vitious dyſcraſie or evill diſpoſition, of the nervots juice. For indeed, the Liquor watering both the nerves, and the nervous parts, ſometimes diſceding from its naturall diſpoſition, is ſo much ſtuff'd with heterogeneous and exploſive particles, that the animal ſpirits, admitting an incongruous *Copula*, every where growing to themſelves, are irritated into continuall, as it were cracklings, or convulſive exploſions: Theſe kinde of Affections of the ſpirits, are either divided or ſeparated, between which no Communication, or dependency intercedes, *viz.* When many parts of the body are troubled at once, with ſo many Convulſions proper to themſelves, which do not come ſucceſſively one from another, but are terminated in the ſame muſcle or member, where they begin: After which manner, I have known ſome ſick people, who have had their muſcles and tendons, all at once in their whole body, perpetually to leap forth, with ſo many diſtinct Convulſions. Or Secondly, the Convulſive Diſtempers, which are excited in the whole nervous kinde together, are continued or connex, which ſucceed one another, with a certain perpetual viciſſitude continued between themſelves: Foraſmuch as inordinate motions, almoſt of all the members, mutually relieving themſelves, being riſen in one part, preſently paſſe over to others. For ſo *Horſtius* relates of a maid, obnoxious to Convulſive motions, whoſe members and Limbs not only were forced into divers manner of flections and diſtortions, but beſides, as if agitated by an evill Spirit, not being able to ſtand in a place, ſhe was neceſſitated to run up and down here and there, and to dance, and leap in the Hot-houſe; nor could be hindred from it by any force or chiding, but that ſhe would run here and there; now ſhe would caſt her ſelfon her feet, now impetuouſly fling her ſelf after another manner, for if ſhe did endeavour never ſo little to be quiet, preſently her *Præcordia* was moſt grievouſly afflicted. Wherefore, the Buſineſs of our preſent task is, to enquire a little more exactly, into the nature and Cauſes of either Convulſive Affection, to wit, both of that, which is affected through the very much leaping of the tendons and muſcles together, and of this, which is cauſed through the madneſs and inquietudes of the members or of the whole body: that from thence it may appear, what method of healing ought to be adminiſtred in either Caſe.

Two kindes of theſe viz. Separate and Connex or joyned t gether.

As to the former kinde, it eaſily appears, that theſe kinde of diſtempers, are not ſimple, but complicated, to wit, of a Convulſion, and Palſie. For the muſcles and tendons, are perpetually urged with Convulſive motions, notwithſtanding, the ſick being made weak, they are not able ſtrongly to move any of their members, or their whole body: yea, to theſe Diſtempers, pains equally diffuſed thorow all the Limbs, are adjoyned. Hence we may infer, that the animal Spirits are imbued, with a manifold *Copula, viz.* both with exploſive, and alſo narcotick ot ſtupifying, and in ſome ſort irritative or provoking particles: ſo that, although being alway burthened, they enter into exploſions, yet, not many together, nor indeed any haſtily or ſtrongly are exploded, by reaſon of the other interjected Particles of another kinde; wherefore the motive force does not long continue, but is ſhort, and as it were interrupted: juſt as if gunpowder being kneeded with ſome muddy ſubſtance, ſhould be fired: for then the whole maſs is not let off at once, with a noiſe, nor does one heap preſently fire another, but a few grains only, and thoſe ſucceſſively, to wit, one a little while after another, with ſmall crackling noiſes, are let off or exploded: In like manner, the nervous Liquor is ſtuffed thorowout, with Convulſive particles, which even cleave to the Spirits: but foraſmuch, as ſome narcotick, and other painfull ones, are mingled with them, the elaſtick force of the former, however laſting, and greatly diffuſed, is yet much broken and every where cut off.

The nature of the broken Convulſive diſtemper.

For the illuſtrating this kinde of broken convulſive Diſtemper, I will here deſcribe a very notable caſe of a certain Gentleman lately living in this neighbourhood: which being truly admirable, not any writings or obſervations of Phyſitians, have ſcarce ſhewed the like. An honourable Gentleman whom I knew, ſprung from Parents, and grandfathers obnoxious to a ſomeways morbid diſpoſition either of the Brain, or nerves, about the hight or beyond the ſtrength of his Age, the fruit of this diſeaſed Race began to puniſh him: for firſt of all, he was wont to be tormented with a debility, and numbneſs of his Limbs, and with light Convulſions; with which kinde of Diſtempers, when he had a while laboured at length,

An obſervation.

for

for cure sake going to the Bath, having used too much the hot bathes, instead of a remedy, he brought back only an exasperation of the Disease, that from that time, the aforesaid Symptoms did not any more torment him by fits, but almost continually, to wit, the Convulsive motions, and painfull extensions, did incessantly exercise every Limb, yea, every part of his Body, so that all the muscles were perpetually drawn together, with repeated leapings all at once, and that not without great torment: The only means he had for quieting them, was to exercise his whole body, sometimes some of his members, perpetually with a local motion: for so long as he was awake, he was necessitated to be rock'd in his bed, or on his couch, or to be carried in a Coach, or to have his members press't or rubb'd; for which end they had made for him a Bed, and a Chair set upon bow-fashon'd feet, such as are on Childrens Cradles, in which, when he lay down or sat upright, he was moved up and down continually, with a tottering or rocking motion; which unless he did, he was infested with most cruel pain, and horrid extensions of his muscles: This kinde of dayly trouble, of the Convulsive Distemper, in the night-time, and presently after sleep, entertain'd much more grievous Symptoms: for being newly awaked, his whole body presently was wont to quake, his muscles to be exercised with painfull stretchings, every Limb to be wetted with a squalid or ill-favour'd sweat, as if in the agony of Death, which was so very Corrosive, that, like *aqua fortis*, unless they presently wiped it off, it quickly eat and rotted the Linnen. The sick man, during this Conflict, was tormented for many hours, between the sweats and shiverings, untill being quite tired out, sleep creeping upon him, brought him some ease; but if at the approach of the fit, he was presently taken out of his Bed, he was better, and so prevented the wonted cruelty of the Distemper: Therefore, as soon as he was awaked from sleep, though it hapned within half an hour, immediatly to avoyd the torture, his servants being called, they took him out of his Bed: As to his Appetite he was well enough, he eat without loathing, nor was his stomack disturb'd with what he eat: Bur he did often complain of the pain of the heart, and sometimes a troublesome Spitting, with a stink in his mouth, as if he had taken *Mercury*, molested him for many days. All hot things, whether food or Physick, did nor agree with his constitution; he did not dare to taste, either wine, or strong beer: In the first years of his sickness, he abhor'd the very sight of the fire, afterwards becoming weaker; though the winter was sharp he would not sit neer the Chimny; his Urine was always of a Citron colour, which if it were evaporated in an earthen vessell, over hot coals, saltish fæculencies remained in the bottom, to above half the Liquor; his belly was continually bound, and never put forth its load, unless provoked by a purge or Clyster: Yea, besides the Convulsive motions, a Spurious Palsie possessed every member of his whole Body, for he could not lift up his hand, nor step a foot forward; his tongue shaking, brought forth his words but imperfect, but sometimes, when his minde was carried forth, by some sudden occasion of Joy, he would be able, his Spirits being raised with a wonderfull strength, suddenly to rise out of his chair, and without the help of another, to stand upright, and to jump, which interval however lasted scarce a minute of an hour, but that his members flagg'd, and were affected with their wonted languor and trembling. When this worthy Gentleman, had been sick after this manner above 12. years, and had consulted the most famous Physitians in all *England*, and had tryed very many Remedies, and almost of every kinde, *viz.* Antiparalytick, antiscorbutick, drying Diets, Sweating medicines, purges, Caustick, baths, Liniments, yea, and had twice tryed salivation, could finde no cure by any method of healing; wherefore, all hope of cure being wholly layd aside, for the latter seven years of his life, he made use of only Remedies, chiefly respecting some Symptoms, *viz.* he took thrice in a week a solutive medicine, of *Senna* and *Rubarb* with Correctives, now in form of a Syrrop, or of an extract another time; every night he was wont to take a dose of an opiate, out of conserves, and temperate *Species*: Besides, as occasions serv'd, he had ready a Julap, to be taken when his Spirits fainted: moreover, he continually drunk Beer, made of oaten mault, altered with temperate and diuretical herbs. By the use of these, he pass'd over at least seven years, without any great alteration for the worse; at length, old Age coming on him, together with the disease, more cruel fits of Convulsions, not as at first after sleep, but assoon as he was warm in his bed, in-

vaded

vaded him, that he was forced to abſtain altogether from his Bed, and rarely put off his cloaths, unleſs to ſhift his Linnen: from hence tranſpiration being hindred, the ſerous Recrements, and others, wont to be evaporated, were fixed on the Lungs, which at firſt, brought in a freqnenr or ſhort breathing, afterwards an Aſthmatical Diſtemper, and laſtly a deadly Conſumption or waſting.

The reaſons of the ſymptoms chiefly tormenting.

If the Reaſons of the aforeſaid Symptoms be ſought after, it will be eaſie, to deduce all theſe evills from a depraved Conſtitution of the Brain, and nervous ſtock, and more immediatly from the dyſcraſie, and fault, of the juice watering thoſe parts. For when that Liquor, in which the animal Spirits, do abound, was, as to its temper, highly ſharp and Corroſive, like *Stygian* water, and as to its mixion, was ſtuffed full of both narcotick and exploſive particles, it is no wonder, becauſe the Spirits being very much burthened, and for that cauſe reſtrained from their due expanſion, that they ſhould be forced every where into ſmall exploſions, as it were Cracklings; and that the containing bodies, being looſed from their due extenſion and ſtrength, ſhould be alſo continually irritated into painfull Corrugations or ſhrinkings up.

The growing worſe preſently after ſleep whence it proceeded.

Thoſe Convulſive Diſtempers, did more ſharply infeſt after ſleep, becauſe the heat of the Bed, did exuſcitate or ſtir up the heterogeneons particles of the nervous juce, and rarifying them, as it were compell'd them into exploſions; then alſo, becauſe the nervous parts did imbibe its juce in ſleep, and a more plentifull proviſion of the morbifick matter, brought together with it; which being filled to a plentitude, at the firſt inſtant of waking, they immediatly endeavour to ſhake off what is troubleſome. For this Reaſon, it is obſerved, that the pains of Scorbutical people, and the fits of Aſthmatical, are made worſe by the heat of the bed, and by ſleep; therefore as in theſe, preſently to leave the bed, was wont to give eaſe, ſo likewiſe it did in our ſick man: But that the trouble, excited by the continual leapings, and painfull extentions of the muſcles, was ſomewhat allayed by the local motion, or moving from one place to another, of the body, or members, the reaſon is, becauſe the Animal Spirits, whilſt they are compelled to divers actions from without; they remit whatſoever inordinations are excited from within: for as in pain, and itching, which are lighter Convulſions, it helps to preſs, rub, or ſcratch the affected part, ſo the Convulſive motions of the muſcles, and tendons, are ſomewhat pleaſed, by the inordinate agitation of the whole body, or the members.

Why allayed by Motion.

The ſpitting.

As to the *Ptyaliſmus*, or copious ſpitting, with the ſtinking breath, which was wont to return at uncertain intervalls, we do ſuppoſe, that might perchance proceed from *Mercury* ſometime ſecretly given, although I have ſeen many labouring both with Convulſive, and alſo ſcorbutick diſtempers, in whom this kinde of perpetual defluxion of ſpittle from the mouth, was very troubleſome, without any ſuſpition of *Mercury*; alſo ſome (as ſhall be told hereafter) on whom a ſalivation coming (the exploſive matter being after this manner Critically evacuated) help'd the diſeaſe: moreover, it is likely, that this diſtemper was produced from the mere recrements of the nervous juice; and that the ſalival paſſages, when many, and enough were open, did receive, and convey forth of doors, the ſuperfluities plentifully depoſited in the *glandula's*, from the nerves, and alſo from the Arteries.

Why this ſick man obtained ſome truce from pains.

As to the lucid Intervalls, whereby the ſick man us'd to obtain ſome truces, though ſhort, the cruelties as it were of the diſeaſe being mitigated, as when but now his ſickneſs had bound him to his chair, he was able on a ſudden to leap up, and walk about; but yet, this unlook'd-for ſtrength being vaniſh'd, by and by falling again into his wonted languiſhment: I ſay theſe kinde of motions of labouring Nature, proſtrate under a great burthen, are its utmoſt endeavours, and ſome more ſtrong inforcements, to wit, whereby for a moment of time ſhe recollects her ſelf, and attempts as it were to ſhake off the yoak of the Diſeaſe; but becauſe ſhe is not able to ſuſtain long this ſtrife, ſhe quickly relapſes, and lies down under her former burthen. Truly it is a wonder, how much above the ſtrength of Nature, Anger, and fear, and ſome other paſſions of the minde, do ſtretch the nervous kinde, and compell them to ſhew a force plainly ſtupendious: But theſe prodigies of her attempts, are only of a ſmall duration.

The ſecret leading cauſe of the aforeſaid diſtemper.

The Conjunct cauſe of the aforeſaid diſeaſe being after this manner deſigned, and the Reaſons of the Symptoms chiefly tormenting, being ſhown, it remains

yet

yet for us to inquire into the ſecret leading cauſe, to wit, by what occaſions, the nervous juice being become ſo degenerate, at firſt brings in the Palſie, and then leapings, or inteſtine Convulſions of all the muſcles: further, we ought to explain wherefore the fruits of this Diſeaſe, increaſing by little and little, came ſuddenly to maturity, by the uſe of the Baths; alſo wherefore this ſickneſs yielding to no Remedies became uncurable.

As to the firſt, it may be ſaid, that the ſick perſon, being ſprung from parents who were obnoxious greatly to Cephallic Diſeaſes, had contracted originally an evill Conſtitution of the brain, and nervous ſtock, ſo that within the 6th luſtre (*i.e.* about the 36th year) of his Age, he began to be ſick of a ſpurious Palſie, then, when the evident cauſes daily fixing the infection more on the bloud and humours, did happen upon this remote hereditary cauſe (for there were many chances, and unfortunate accidents, which continually brought ſadneſs, and melancholly upon this Gentleman) indeed therefore, the nervous Liquor being imbued above meaſure, with a fixed and Scorbutic ſalt, became highly ſharp and irritative, like *aqua fortis*, or the Stagma's of *Vitriol*; and ſo continually incited the Spirits, and the bodys containing them, into Corrugations and contractions, juſt as the aforeſaid Liquors when poured upon worms do the ſame thing.

Why this Diſeaſe grew worſe by the uſe of the Baths.

But that this diſeaſe, leaſurly at firſt increaſing, was quickly brought into a much worſe condition, by the uſe of the hot Bathes, the reaſon eaſily appears: It is known by experience, that the hot Bathes, do very much exalt, and quickly bring to the hight, the Sulphureous-ſaline particles, in the humane body, and otherwiſe morbid, which abound in the Bowells, and humours, *viz.* do render them more fierce by agitating them throughly, and force them from their firſt paſſages into the blood, and from thence into the Brain and nervous ſtock, yea, and joyn together thoſe, that were before ſeperate, and idle, and incite them into a certain fermentation: wherefore, thoſe who are hereditarily obnoxious to the *Gout* or *Stone*, and have not as yet ſuffer'd any fits of thoſe diſtempers, very often feel the fruit of either diſeaſe in themſelves to grow ripe ſoon, by the uſe of the Bathes: When therefore in this ſick perſon, both the blood, and Liquor watering the Brain and nerves, were imbued both with narcotick or ſtupifying, and convulſive particles; and alſo when they did degenerate from their ſweet, and balſamy Diſpoſition, that towards a ſaltiſh, and this into a ſour, *Cæmul* of a *Stagma* of *Vitriol*, the uſe of the hot minerall waters, was ſo far from bringing help, that on the contrary, theſe evills, for that very cauſe, preſently grew all very much worſe: and the Diſeaſe, proceeding from the humors being ſo depraved, as to their temper and mixture, could never be cured by any medicines, no eaſier than vinegar may be reduced into wine.

When this Gentlemans body, being at laſt dead of the *Phthiſis* or *Conſumption*, was opened by me, we could finde but very few foot-ſteps, of theſe kinde of moſt grievous Symptoms. Hence, as it appear'd, the *Palſie* and *Convulſion*, did not depend, ſo much on a thick and copious matter, heaped together ſomewhere in mines, as of an evill affection of the animal Spirits, who are ſubtle and Inviſible. I will lay forth, what was worthy taking notice of, in the anatomy of this perſon.

Thing worthy to be noted in the body being diſſected.

The *Abdomen* being opened, the *Caule* (as is wont to be in moſt who dye of a Conſumption, and other Chronical Diſeaſes) was putrified, aud almoſt conſumed. In the mean time, the *Ventricle*, *Inteſtines*, *Pancreas*, and *Meſentery*, were well enough, to wit, the membranes were firm, well coulour'd, and free from any ulcer, or hard ſwelling: There grew to the greater Inteſtines certain excreſcencies like to the ears of a mouſe; for that there were very many of theſe kinde of things out of either ſide of the *Colon*, and right inteſtine, they ſhewed like twins at certain diſtances, like the branches of Trees: The like I formerly found in a Conſumptive perſon: The Reaſon of this ſeems to be, that the nouriſhment in Conſumptive people, (though it be deficient about the more ſolid, and outward parts, yet ſometimes) within neer the fountains of the nouriſhing juice, performs more than it ought, and for that cauſe, ſuperfluous and unnaturall additions grow forth.

The milt or Spleen, which always is thought ill of, and of moſt Phyſitians condemned, for being the Principal cauſe of the Scurvy, and of all other diſtempers, appear altogether blameleſs, and free from any fault: For, as in moſt

ſound

people, we obſerved, it was of a darkiſh Colour, ſoft and of an equal *ſuperficies*, free from any obſtruction, or ſwelling, indued withveſſells, and *fibres*, diſtinct, and firm enough: out of its ſubſtance, flowed black biood when it was cut.

The Liver (which indeed might be wondred at) was indifferently well, neither was it, from ſo long and grievous a ſickneſs, become harder then uſuall, or ſcirrhous, or planted with little whelks, but it was ſomewhat big, and of a darkiſh colour.

The Kidnys, though free from any ulcer, or gravell, were not however free from fault: for in the middle of the right Kidney, was ſeen a great cavity, diſtinct from the Tunell, and much greater then it, full of clear water: the like I have very often found, in hydropical people: But indeed, this perhaps aroſe, from the *ſerum* depoſited in that kidny, that could not eaſily be ſtrained thorow its paſſages, and pores; for that the *ſerum* ſubſiſting therein, had in the beginning made for it ſelf a little den, which afterwards by degres was inlarged, and when for this Reaſon, the ſecretion of the *ſerum*, and its paſſing forth by the *ureter*, were ſomething hindred, its *Latex* reſtagnatiug into the blood, brought in the grievous trouble to the head; which indeed was the rather to be ſuſpected, becauſe alſo the left Kidny, being mightily extenuated, and conſumed, contained many Ciſterns, and Cavities full of clear water.

The Lungs, growing on every ſide to the *Sternum*, (or part of the breaſt where the ribs meet) ſides, and *Diaphragma*, ſeem'd without any diſtinction of *Lobes*, of one ſubſtance only of putrid ſpongy fleſh, ſtuffed throughout with a frothy or ichorous matter: without doubt, the ſick man had not contracted this evill ſo long before, to wit, when he was not able to perform any exerciſe of the Body, nor ſtay in bed that it might breathe out any thing more freely, the fæculencies and recrements of the blood, which were wont to evaporate thorow the skin, being layd up in the Lungs, were the cauſe, that they grew together among themſelves, and with other parts, and did vitiate their tone and conformation wholly, ſo that, a Conſumption being at laſt ariſen, was the effect and product, and not the cauſe of the reſt of the diſtempers, wherewith he had bin a long while miſerably afflicted.

In either ventricle of the heart, blood was concreted into a ſolid whitiſh ſubſtance, and bak'd like fleſh, which being formed neer the Cavities, and proceſſes of the veſſells of the Heart, reſembled the figure of a Serpent, with a manifold divided tail: than which indeed nothing is more uſual, in many dead People after long ſickneſs: The reaſon of which is, that the Blood being without life, from long ſickneſs, and from thence circulated ſlowly abont the *Præcordia*, begins to ſtand or ſtagnate in the heart, and depending veſſells, and by that means, is congealed leaſurely, into this kinde of fleſhy Concrete.

When the Skull was opened, we ſought among its contents, the chief Cauſe of the Diſeaſe: The firſt thing that occurr'd was, the bulk of the brain was leſs than it ſhould be, and folded into fewer folds, from whence we ſuſpected, that the Animal Spirits, were uot plentifully enough brought forth: Further, the whole ſubſtance of the head, was more moiſt than it ought to be, and wholly immerſed in a wet watery humour, that its Covering, *viz.* the whole meninges, were pulled aſunder, and the compaſſing or crevices, and all the ventricles, run over with clear water. 'Tis probable, that this deluge of the Brain, had lately hapned, to wit, foraſmuch, as by reaſon perſpiration being hindred, and the Secretion of urine being but little, the ſeroſities gathered together in the bloody maſs, were carried to the head, and therefore, the ſubſtance of the Brain, and eſpecially the chancelled or chequer'd bodies, were ſo wholly wetted, and ſoked, that being cut, their ſubſtance could ſcarce remain compacted, but that it would flow away, ſomewhat after the manner of thick Liquids: within the boſoms overlying, and inſerted to the brain, and its *Appendix*, and the veſſells coming from them, the blood had concreted into little, round, hard, and as it were fleſhy balls, juſt like thoſe within the ventricles of the heart, and the veſſells hanging to them, which alſo lately, when the Bloud circulated ſlowly, we thought might happen, for the ſame reaſon, for which the blood was coagulated within the *Præcordia*.

The trunk of the Spinal marrow, being drowned in clear water, was very much extenuated, that it could ſcarce fill half of the bony cavity or hollowneſs:

which we thought to be effected, by the deluge of salt *Serum*, in which it was as it were boyled.

The Nature, and the manner, of the continued convulsive distemper being made

So much concerning universal Convulsions, which being very much conjoyned with the Paralytick Distemper, are excited dividedly in many parts at once: There remains others, which we call'd continued, because being suddenly translated, from some parts to others, they mutually relieve one another, and compell the members; now these, now those, and often the whole body, to be involuntarily moved, and diversly bended, or agitated. In these Cases, the *Animal Spirits*, not only those implanted in private corners, and mines, get to themselves an explosive *Copula*, and being some how satisfied, or irritated, strike it off by certain turns; but when the whole mass of the nervous Liquor, abundantly abounds with elastick particles, they then every where cleaving to both the Spirits implanted, and flowing in, for that reason stir them up into Continuall Convulsions: But forasmuch, as not all the Spirits at once, are not able, however predisposed, to be exploded, (because within the nervous passages, there is not room large enough for their so great agitations) therefore the explosive force, arising in these, or those parts, is by and by transfer'd, from thence, unto others, and so to others, and so like fire-draks, or wild-fire, it runs wandringly here and there, most swiftly creeping from these Limbs, to those, and then presently from all into the *Præcordia*, or *Viscera*, and back again. That the Image of those kinde of distempers may be known, we will here propose some more rare Cases; of sick persons, whom sometime past I endeavoured to Cure.

I. Observation.

A very fine and religious maid, tall and slender, begot of a Father sickly, aud obnoxious to most grievous Distempers of the nervous kinde, about the 20th year of her Age, was afflicted for many days with an head-ach, very Cruell and periodical; at length, at the time of the winter solstice, 1656. the pain of her head ceased, but instead of it, a mighty Catarrh followed, with a thin and Copious spitting, also an ulcerous distemper of the nose and throat; when she had for some time endured this trouble, at length, by the prescript of a certain Woman, receiving the fume of *Amber* by a tunnell into her mouth, she was suddenly cured, to wit, the Catarrh, or violent Rhume ceas'd suddenly, but from thence she complained of a notable *Vertigo*, with a pain in the head, and of the tingling noise of the ears: on the Third day, the tendons of the hinder part of her neck, were pulled together, that her head was bended now forward, now backward, and now of one side, sometime it continued stiff and unmoveable; a little after this, the same kinde of Convulsive Distemper invaded the outward members, and Limbs of the whole body, her arms and hands were wonderfully turned about, that no jugler or tumbler could imitate their bendings, and rollings about; she was necessitated to spread abroad her leggs, and feet, here and there, to strike them against one another, and to transpose or cross them by turns: After this manner either sitting in a Chair or lying in a Bed she was perpetually afflicted with these Convulsive motions, unless when overwhelmed with sleep; and when she did a little restrain her members from the great labour of the Muscles, presently she was taken with a difficult and short-breathing with a sense of Choaking; but in the mean time, her eyes, jaws, mouth, and lower bowells, remained free from any Convulsion; neither was she troubled with vomitiug, belching, nor any inflation of the belly, and *hypochondria*: Besides she was still her self, and had truly the use of her memory, understanding, and phantasie, she did, nor said any thing madly, or foolishly: bnt in these wonderfull evills, she shew'd an admirable example of Christian fortitude, and patienee, even with godly and discreet speeches; her appetite was soon lost, so that she took any meat or aliment very unwillingly; thirst continually troubled her, and her strength was grown so feeble, that she could not stand or walk, her urine was of a Citron colour, very full of saltness, on whose *superficies* grew little tararous skins.

When I was sent for to this Gentlewoman, on the Sixth day of her sickness, I framed the Ætiology of this kinde of admirable distemper: For the consideration of her father, who at that time was sick in the same house, with most grievous Convulsive passions, kept me, that I did not with many others, refer all things to the delusions of witches: wherefore, that I might seek out the natural Causes of these Symptoms, it was in the first place plainly to be suspected, that this Gentlewoman

Gentlewoman had contracted hereditarily the ſeeds of Convulſive Diſtempers; which at length, about the flower of her age, broke forth into this kinde of fruit: for when her blood was very much imbued with heterogeneous and explo-ſive particles, they at length (as is wont in ſuch a diſpoſition) began to be poured into the head, and there to be fixed: being therefore firſt depoſited in the *Meningæ*, they induced the huge periodicall head-ach; then afterwards, the ſame matter having accidentally ſhifted its place, falling down into the ſinks of the throat and mouth, changed the *Cephalage* or head-ach, into a *Catarrh* or *Rhume*: and when laſtly by an untimely uſe of the adminiſtred Remedy, the defluxion ſtop'd, the morbifick matter flowing back into the brain, brought the *Vertigo*; and then, being thruſt forth on the nervous ſtock, it excited the aforeſaid Con-vulſive Affections.

The reaſon of the aforeſaid caſe.

As to the formal Reaſon, or the means of generation, whereby the Convul-ſive matter, falling down into the nervous ſtock, did produce theſe admirable Symptomes, we may lawfully ſuppoſe, that the ſame being thruſt forth from the Confines of the head, being yet more firm, into the ſpinal marrow, and its *Ap-pendix*; and being like a malignant firment, it firſt infected, with heterogeneous and highly exploſive particles, theſe parts of the juce watering the whole maſs; which cleaving to the ſpirits, every where diſpoſed thorow their whole *ſeries*, and agitating them, as it were with a certain fury, did ſtir them up into continuall exploſions: When in truth, the nervous juice, as is ſaid, was ſo fermented by the inflowing of the Convulſive matter, that which did other ways water the contain-ing parts, with a gentle falling on them, and through the ſame; did paſs over the animal ſpirits, with an equal Expanſion; now the ſame did torment the ner-vous *fibres*, with various contractions, and Corrugations or ſhrinkings up, and did hinder both the ſpirits flowing in, being too much burthened with an hete-rogeneous *Copula*, from their due irradiation, and alſo variouſly moving thoſe implanted in every part, did incite them, as it were with a diabolical Inſpira-tion, ſo that no more obeying the Empire of the will, they ran into inordinate motions, and did renew them, tranſlated rapidly here and there, with a perpe-tuall reciprocation.

But, altho the heterogeneous particles, being poured forth with the blood, into the brain, and thence thruſt forth into the nervous ſtock, did not enter rightly the beginnings of all the nerves, but chiefly and almoſt only the ſpinal marrow, and its nervous ſhoots; ſo that the internal *Viſcera*, alſo the parts of the eyes, mouth, and face, remained free from any Convulſion: yet, that ſame exploſive force, being hindred by ſome violence, whereby it entred leſs in the outward members, preſently like wild-fire, a way being found, it was wont to run into the *præcordia*, and bowells of the lower belly: *viz.* becauſe the inflow-ing ſpirits, being ſtruck with a certain fury, and requiring a larger ſpace, in which they might exerciſe their madneſs, being excluded from one place, pre-ſently enter another ſomewhere open: wherefore, if that fury had been repulſed, both from the members, and the *viſcera*, no doubt but it would have flown back on the brain, and brought thither, madneſs, or as it were an Epileptical Inſenſi-bleneſs: which Symptoms indeed hapned to be wanting, for that the brain of this moſt ingenious Gentlewoman, being indued with a more firm Conſtitution, did take from the nervous Liquor freſhly inſtilled, whatſoever was congruous and ſpiritous, for its proper food, and enjoy'd it: In the mean time, it did depreſs all the morbific particles, into the ſpinal marrow, by which the involuntary moti-ons of the members were excited, after that manner as we ſaid but now.

The Curatory Method Obſer-ved in this caſe.

Being requeſted to undertake the Cure of this worthy Virgin, firſt, a light preparation of her body being made, I gave her a ſolutive potion of the Infu-ſion of *Senna* and *Rhubarb*, with *yellow Sanders* and *ſalt of Wormwood* added to it, by which ſhe was purged 12 times with great eaſe, the next day I took viii. ounces of blood from her left Arm, every evening I gave her an opiate of the water, and Syrrop of the *flowers of Lungwort*, with the *powder of pearls*: beſides, once within vi. hours, I preſcrib'd her to take a doſe of the *ſpirits of Harts-horn*, in a draught of the following Julap. Take of the *waters of black Cherries*, *Walnuts*, and the *flowers of Pæony*, each ℥ iii. of the Antipeleptic of *Langius* ℥ ii. of the *Syrrop* of the *flowers* of the *male-pæony* ℥ii. of the *powder of pearls* ℈ i. mix it and make a Julap: becauſe ſhe could not endure much purging, *Clyſters* with Sugar'd-

milk, were made use of frequently : besides antispasmodic oyntments, being applyed to the hinder part of her neck, and the back-bone, we order'd often rubbing of the distemper'd members, with warm woollen Cloaths wetted in proper oyl.

By the use of these, the sick person within 6 days, seem'd to be very much helped ; for the Convulsive motions allmost wholly ceased,and she could contain her members quietly in their due position, only her head sometimes by a lighter Contractiou was compelled to bend gently this way and that way ; further she was able to stand a little, and rise out of her chair, but when she went to step forward, she went not rightly, but obliquely on one side : At this time going away, I left her much better, and in a manifest state of growing well : But after another week, when the North-winde being high, and arisen in Night time, the window not being fast shut,blew very much upon the sick person being in Bed,she presently taking cold, relapsed into that kinde of Condition, that she became obnoxious not only to Convulsive passions, but to an universal periodical palsie : for after that she was forced to move about, turn, and winde variously, all her limbs successively, with her head, and members by turns, bent, and thrown about here and there (as before) from morning to night ; till at night these kinde of motions wholly ceasing, a resolution of her members, or palsie succeeded, so that she was not able to stir either hand or foot, or any other part of her body besides, or to exereise any motive bending of the body, lying in her bed allmost immovable like a stone ; but being a little refresh'd with sleep, about morning, as she recovered some little strength or virtue of the regular motive faculty, by bending, tho but weakly here and there, her arms, and legs, so also the involuntary, and Convulsive motions, did constantly return, enduring from that time, all the day, which again at the Evening, were changed into these resolutions of the Limbs.

By these it appears clearly, that the sick Gentlewoman laboured with a twofold disease, *viz.* a Palsie, and Convulsion, and that the materiall Cause of either, was somewhat distinct : For it seems, that the animal spirits, every where abounding, being burdened with narcotick particles, were almost continually bound : besides that, in the time of sleeping, together with the nervous juiee,the Convulsive particles, plentifully flowing in, clove also to the spirits : for the explosions of which, the spirits being incited, produced the involuntary motions : but also at that time, the narcotic *Copula* being somewhat shaken off, they were then able in some sort to perform the voluntary or regular also : Besides the Remedies but now recited, they did carefully administer very many others, allmost of every kinde, *viz.* Antiscorbuticks, antiparaleticks, Decoctions, sudorificks, or sweating medicines, distilled waters, spirits, Elixirs, Tincture, Baths, Liniments, with many others ; by the use of which, the Symptoms were something remitted, but yet the disease was not wholly cured, the universal palsie soon ceased, that she was able at any time to move her Limbs, and to bend them here and there ; and also the involuntary motions did trouble her but rarely, yet she continued Languishing, and weak ; and when she being of a more fine temper, and prone to a Consumption, by reason transpiration was hindred, the recrements of the bloods being laid up in the Lungs, brought in a Cough, which every day growing worse, she at length dyed of a *Phthisis* or wasting.

2. *Observation.* Some years since, I was sent for to a Noble Virgin, sick almost after the same manner, and something worse : For this suffer'd almost perpetually, coming by turns, involuntary motions, to wit, shakings of the head, and members, or deflections, or movings about here and there : besides, she was afflicted with an exceeding troublesome, and plainly wonderfull Convulsion, of the *Diaphragma*, and muscles serving for breathing : for every minute of an hour and oftener, her back-bone was suddenly bent in, about its middle, and together her breast shooting out forward, and her *hypochondria* being drawn inwards, she made a noysie sobbing, now double, now threefold, but still with a less and less noise : this kinde of motion, and ebbing of a crashing noise, was wont to come for many hours, and so that she might be heard through the whole house ; and when any short interval of this hapned, she was compelled presently to shake, or writhe together extreamly her arms, and hands, and sometimes her legs and feet, and also to fling about most furiously her head, and by and by to hold her neck

neck, as it were ſtiff and immovable: and then in ſpeaking, her tongue would be taken after that manner, that ſhe would repeat the ſame word very often, yea ſometimes twenty times at leaſt: when the Convulſive motions tormented her ſtrongly in her outward members, ſhe was free for a little while from that throtling, and noiſie diſtemper, and this ſpace of intermiſſion ſhe call'd her time of eaſe; tho in the mean time, her head, and members were carried violently here and there, with Convulſive Motions: if at any time ſhe lay on her left ſide, preſently a contraction of her right *hypochondrium* inwards, with a ſobbing or throtling, vex'd her. Within a few days, her ſtrength being very much loſt, by the aſſiduity of the paſſions, ſhe contracted ſo great an imbecillity in her Loyns, and joynts of her legs, that ſhe could not ſtand, nor lean on her feet: Her Stomach, diſtemperd either with weakneſs, or the Convnlſion, retnrn'd back whatever was put into it, by vomit.

The nature and cauſe of the diſcribed caſe.

In this Caſe, as in the former, it appears, clearly, that the Animal ſpirits, not only thoſe implanted in this or that part or region, had contracted an heterogeneous *Copula* to be ſhaken off by ſome turns, but alſo the ſpirits influencing ſome nerves, being imbued with exploſive particles, had brought in the perpetuall, and wandring Convulſive Motions. And when at firſt it hapned, that the ſpirits ſo afflicted, did aſſolt, not all the nerves together, nor any indifferently, but for the moſt part, only thoſe belonging to the *Diaphragma*, and the *Appendixes* of the ſpinal marrow, ſo that within thoſe ſpaces, the fury of the ſpirits, perpetually exploſing, was limited, for this reaſon it hapned, that the convulſive affections being reſtrained, in any one of thoſe parts, did break forth more furiouſly ſtrait in another; and when by their proper inſtinct, their motive force was imployed in one Region, the ſame was in the mean time, wont to be remitted in another. Moreover in this ſick perſon, the morbific matter, conſiſting both of narcotick and convulſive particles, cauſed together the paralytick, and convulſive diſtemper.

Coming to her on the 4th day, I gave her an Emetick potion, by which ſhe vomited 7 times, abundance of ropy phlegm, with yellow choller, yet without any eaſe: on the next day, I took ſix ounces of blood, from her left Arm, preſently from thence, the blood being more impetuouſly carried, towards the head, ſhe complained mightily of an head-ach, and giddineſs; But within 3 days ſhe being let blood in the foot, found her ſelf better: ſhe afterwards took Remedies for the diſtempers of the nerves, to wit, *ſpirits of Harts-horn*, and of *blood*, *Bezoartick*, and *ſhelly powders*, *Julaps*, and *Electuaries*, antiſpaſmodical: by the uſe of theſe, the Symptoms ſeem'd to be ſomething remitted, but yet they remained ſomewhat after the manner but now deſcribed: After a fortnight, by the preſcription of a certain Country-Woman, ſhe took in a draught of beer, 6 ſpoonfulls of *blood*, taken from the ear of an Aſſe, by which ſhe ſeem'd on a ſudden to be cured: for forthwith all the Convulſive motions did leave, and ſhe remained free from them 24 hours; but yet the diſeaſe returning the next day, with its wonted fierceneſs, would not give place, neither to that Remedy, nor indeed eaſily to any others: ſhe therefore for the future, took medicines methodically preſcribed: Once within 6 days, ſhe was gently purged, beſides ſhe took the powder compoſed of *Bezoar*, *pearls*, and *Corrall*, with the roots and ſeeds of *Pæony*, alſo an Electuary, preſcribed by *Horſtius* for theſe kinde of admirable Convulſions; alſo *Julap*, and *decoctions*, proper in convulſive Diſtempters: *Clyſters* were often uſed, frictious, oyntments, and veſicatories were adminiſtred with ſucceſs: within another week, the ſobbing affection wholly ceaſed, and likewiſe the other convulſive motions, being grown more gentle by degrees, very much remitted: Growing well of theſe diſtempers, a *Catharr* falling down in her throat, ſhe was ſo much troubled, that ſhe almoſt continually ſpit forth a ſharp, and as it were Corroſive ſpittle, as if ſhe had had a ſalivation by taking *Mercury*: which kinde of Remedy indeed, hath been found to have been the laſt event in this caſe: but I wholly abſtained from adminiſtring it, becauſe both the ſick, and her friends, would not give me leave.

After this plentifnll, and troubleſome ſpitting had continued for many days, the diſeaſe ſeem'd almoſt to be wholly Cured: ſo that this noble Gentlewoman, being free of her Convulſive motions, went abroad, and was well, both in ſtrength and ſtomach. Only ſhe complained, that oftentimes in a day, ſhe

was

was ſuddenly afflicted, for about a minute of an hour, with a ſhivering of her whole body; which kinde of Diſtemper coming upon her ſometimes in the night, broke her ſleep: within the ſpace of a month, this Symptom alſo, and likewiſe her Catarrh wholly ceaſed: But from thence, ſhe was ſometimes afflicted with an extream Soureneſs, in her ventricle, and the paſſage of the *Oeſophagus*, and ſometimes alſo in her mouth, and pallate, that it was feared leſt the inward skin being fretted, thoſe parts ſhould Contract an ulcerous diſpoſition; beſides ſhe was wont to be tormented often in her ſleep, ſometimes alſo being awake, with the night-mare or *Incubus*. For this I preſcribed, *Spring* and *fall*, a gentle purge to be adminiſtred, with the uſe of antiſcorbutick Remedies, and ſometimes *Chalibiates*, or medicines of *prepared ſteel*, which kinde of method ſhe obſerved ſo much to her benefit, that ſhe was well in health for many years, and is as yet well.

Among the many Remedies, which were taken againſt that Sourneſs, and as it were ulcerous diſpoſition of the pallat, and *Oeſophagus*, I preſcribed, that ſhe ſhould drink every morning, her own urine freſh made; this, whilſt it was very Saltiſh, was wont to give her great eaſe; but at ſometimes, her urine flow'd from her thin and plentifully, which being nothing ſalt, but like to ſour vinegar, from the drinking of that ſhe received little or no benefit.

The *Reaſon* of the Caſe but now deſcribed, ſeems not much unlike the former, unleſs that in this ſick Gentlewoman, the exploſive particles had enter'd into more paſſages of the nerves, to wit, beſides the *appendixes* of the ſpinall marrow, into thoſe dedicated for the office of breathing, and alſo by fits, into thoſe deſigned for the motion of the Tongue, and almoſt perpetually tormented the Spirits abounding in them, with Rage or fury.

But that the Cure of this Diſeaſe hapen'd, by the falling down of the ſharp humour, into the emunctories of the mouth, and throat, we may from thence gather, that the material Cauſe of this, was the heterogeneous particles, and as it were nitrous, begotten in the blood; which, when from thence, being paſſed thorow from the brain, they were carried into the nervous ſtock, cauſed the aforeſaid Diſtempers: But aſſoon as by the help of Remedies, the more plentifull proviſion of that matter was hinderd, and the morbifick particles allready produced, both from the blood, and the Brain, and nervous ſtock, were derived into thoſe emunctories of the head, the Convulſive Diſtemper preſently ceaſed, and within a ſhort time, ſuch a Criſis or ſecretion ſtill remaining, the perfect Cnre of the Diſeaſe followed.

Foraſmuch as the urine, being of it ſelf very ſalt, and as it were lixivial, became at ſome times ſouriſh, which did not give any help, as the former, to the ſourneſs of the throat: it may hence be gathered, that the ſalt particles of the blood, and humours, coming away by the urine, had a twofold ſtate or condition, to wit, of fixedneſs, and fluedneſs; wherefore the ſerum, imbued by them, became now of this, now of that nature: for it ſeems, that the Saline particles, being degenerate within the maſs of the blood, remained fixed, and rendred the urine for the moſt part Lixiviall: but thoſe which flowed without the blood, in the nervous juce, or were laid up about the ſolid parts, did degenerate into a flux or acetouſneſs: and therefore from theſe, being derived into the emunctuaries of the mouth, that noted ſourneſs of the mouth, and *Oeſophagus* proceeded: moreover, when theſe kinde of particles, being gathered to a fullneſs in the nervous juce, and ſolid parts, did ſwell up, and ariſing to a fluxion, boyled up into the blood: preſently theſe being ſent away from thence, in heaps, thorow the Reines, rendred the urine, increaſed in quantity, ſouriſh. But foraſmuch, as the Saline particles, being of a divers Condition, and that thoſe of the ſame kinde could not be mingled together, they mutually moved againſt one another, and break their forces, therefore the ſalt urine, and not the ſour healed the ſourneſs of the throat. It appears by a vulgar experiment, that the moſt ſharp *Spirit of Vitriol*, by the mixture of the *Salt of Tartar*, or any other lixivial, grows very milde: yea, and yet from thence appears, that the acid humour, ſweating out into the parts of the mouth and throat of this Gentlewoman, came near the nature of ſharp *Vitriol*; becauſe the fume of Tobacco, being taken at the mouth of the ſick perſon, was wonderfully ſweet, as it happens to ſuch, who have beforehand taſted *Vitriol*.

Becauſe

Becauſe we treat here of admirable Convulſions, which do not ordinarily happen, and whoſe nature, and cauſes ly deeply hid; for the better illuſtration of theſe kinde of Diſtempers, we will yet ſhew one or two more Caſes, no leſs wonderfull than the former.

3. *Obſervation.* About ten years ſince, I viſited the daughter of a certain Nobleman, troubled after that manner with Convulſive motions, that ſome thought her poſſeſſed with an evill Spirit: This Virgin about 16. years of age, fair, and well-made, yet begotten of a paralytick Father, without any evident Cauſe, about the winter-ſolſtice began to fall ill. At firſt ſhe was troubled, though not in any grievous manner, with an head-ach, and giddineſs for many days; then ſhe felt, now in one of her arms, and then in another, a trembling and ſudden Contraction; which kinde of Convulſions, returning often that day, endured ſcarce a moment; the next day ſitting nigh her Siſter in a Chair, ſuddenly leaping out, ſhe fetch'd one or two jumps, and many others ſucceſſively, with wonderfull agility, at the diſtance of many feet; then, when ſhe was come to the farther part of the Chamber, ſhe ſtood leaping a great while in the ſame place, and every time to a great height; when her legs were quite tired with leaping, ſhe fell on the floor, and preſently ſhe flung her head here and there with wonderfull violence, as if ſhe would ſhake it from her neck: As ſoon as ſhe ceaſed from this motion for wearineſs, preſently the ſame fury invaded her hands and feet, ſo that ſhe was forced ſtrongly to exerciſe theſe members, by ſtriking the walls or poſts, or by beating the pavement: when by reaſon of ſhame or modeſty, due to her friends, and by-ſtanders, ſhe did hinder her ſelf with great violence, from theſe motions (for all the while ſhe was her ſelf, and ſpake ſoberly) the diſtemper being ſent inwardly, ſhe was very much infeſted, with a mighty oppreſſion of the heart, with a bemoaning and very noiſefull ſobbing; then, when ſhe would eaſe her ſelf, ſhe was forced preſently, the fury being tranſmitted to the muſcles of the outward Limbs, either to leap about, or to fling here and there cruelly her head, or arms, or alſo to run about the Chamber, moſt ſwiftly, or to beat the ground with her feet: becauſe theſe kinde of vehement motitions, of her Limbs or *viſcera*, in the Tragedy of the diſtemper, did mutnally relieve themſeives, returning as it were in a round.

The Curatory Method. Coming the 5th. day after this Lady had been ſick, I gave her a vomit of the fuſion of *Crocus Mettallorum*, *wine of ſquills*, and *ſalt of Vitriol*, by which ſhe vomited 7 times, cancker'd oile or choller, in a great plenty, with the mixture of a ſharp, and as it were vitriolic humour: The next day ten ounces of blood was taken from the *Saphana* vein; beſides, ſhe took twice in a day, antidotes of the *powders* of pretious Stones, of *humane ſkull*, and the *root* of the *male pæony*. By the uſe of theſe, within a week, ſhe ſeem'd to be cured, ſhe continued for many days afterwards free from the aforeſaid diſtempers: Bnt after two weeks at the time of the full Moon ſhe fell into a relapſe of the ſame diſeaſe more cruell than before, for beſides thoſe wonderfull leapings, and vehement Converſions and roulings about of her head and members, ſhe was forced beſides, to fetch often a moſt rapid courſe round about the Chamber: ſhe began at this time, from the præſcripts of others, to take anti-hyſterical Remedies, and purges at certain ſet intervalls, but without any help: At laſt, I being ſent for, becauſe ſhe ſeemed indued with a ſtrong habit of body, and with a notable fierceneſs of ſpirits, I gave her a ſtronger Emetick, by which ſhe vomited forth ten times, greeniſh Choller, like to ruſt, with phlegm, ſharp like ſtygian water, and ſhe was ſuddenly eaſed: After this, I gave her every morning, a draught of white-wine, dilated with the *water* of *black Cherries*, with ſows or hog-lice bruiſed and infuſed therein, and ſtrongly preſſed forth. By the Uſe of theſe, ſhe ſeem'd preſently to be cured, and was well above a Month: And when afterwards, the diſtempers being about to return, ſhe felt at any time ſome forerunners, preſently by the uſe of a vomit, and the expreſſion of the *Millepedes* or *Cheſlogs*, ſhe averted the approach of the Diſeaſe: within three months, ſhe ſo far recovered her former health, that ſhe has now liv'd for many years, free from thoſe kinde of Convulſive diſtempers: But from the time the convulſive paſſions wholly ceaſed, ſhe was ſometimes troubled, about the parts of her mouth, and throat, with a defluxion, of a moſt ſour humour, like the vitriolick *Stagma*; beſides ſometimes ſhe was obnoxious to the *Pica* or longing of women, and at ſometimes alſo to the Cough;

Cough, with a discolored spittle, threatning a Consumption, notwithstanding which, by remedies used in these kinde of Cases, she was easily cured.

The reasons of aforesaid case. As to the Ætiologie, or Rational account of the aforesaid Case, there is no reason that we should fear to refer both the Causes, and Symptoms of this disease, to the explosive particles (the brain being pass'd thorow without hurt) sent as a supply, Continually from the blood, into the nervous stock; which, forasmuch as they being poured forth in great plenty, were not restrained within private mines, to be struck off only by turns, cleaving every where, both to the implanted, and inflowing Spirits, forced them, as it were inspired with a madness, to be perpetually exploded, and to grow raging here and there, by bands: so that indeed, they were not able at all to be ruled; within the containing parts, but there was need to overthrow, and to tame them, impetuously tumultuating, and apt to be carried here and there, like a whirlwinde, by some very violent and strong exercise. In truth in was in this sick person, as it is in musical Organs, which if filled above measure, by too great a blast of winde, unless presently the passages of more Pipes be opened, the whole frame of the Organ is quickly shaken, and in danger to be broken to pieces: In like manner in this Lady, when the animal Spirits, actuating the pipes, and the depending *fibres*, of some of the nerves, were moved beyond their due tenour, there was a necessity, that their force shonld be bestowed on many vehement local motions together, whilst they inflated above measure the nervous bodies: wherefore, when their madness was hindred in on part, by and by like winde pent up, creeping somewhere else, it broke forth more violently, in some other part.

In this sick person, the use of one or two Vomits, brought help once or twice, because that by it, what was lodged in the gallie-vessell, yea the *glandula's* and emunctuories, and also about the *viscera* of concoction, being by this means emptied, the purging of the blood, and nervous juce, were more Copiously drawn into the same place; therefore indeed, that the animal Spirits, flowing within the Pipes of the distemperd nerves, might be less infected by them: By this reason also, the juice of the Sows or hog-lice was beneficial, forasmuch as it derived the morbifick matter, from the nervous kinde, to the urinary passages: Besides these Remedies, the Root and in a great part the branches of the morbific matter being cut off, and when others, as it were antidotes, hindring every where its vegitation, were carefully administred, whatsoever was left of it, Nature at length becoming superior (as she is wont in these criticall Cases) sent away, to the sinks of the mouth and Throat.

4. Observation. Whilst I was writing these things, I visited an illustrious Virgin, who was troubled with other kinde of Convulsive motions, and those universal, and no less to be admired: she was about 18. years of age, hansome, and well made, and before this time healthfull; when the Pestilence raging in this neighbourhood, she had come within the danger of its Contagion, she fell into a panick fear, with frequent swouning; the night fellowing, she suffer'd so great a *deliquium* or sinking down of her Spirits, and insensibility, that she seem'd just a dying: hardly strugling with so great an evill, afterwards she had every day Convulsive fits, though at first at uncertain hours, and returning after a manifold Kinde: But within a short time, its comings being made regular, twice in a day, to wit, they constantly returned at eleven of the clock, and before five in the afternoon, that no intermitting feavour, kept more exactly its periods; yea, also, the same accidents of the fit dayly chanced after the same manner.

When she had thus been sick for three weeks, one day I was sent for, that I might take notice of all the Symptoms, and the whole figure of the disease: she being up about ten in the morning, was well, in her Countenance, going, and speech, she behaved her self exceeding well, so that none would ever suspect her to be sick: at eleven of the clock, she began to complain of a fullness of her head, and numbness of Spirits, with a light swimning; by and by she felt a great pulsation, and as it were the leaping of some live animal, in her left *hypochondrium*: putting my hand on her side I plainly perceived this motion; then a stretching and belching followed, which done, she was presently put to bed, and a maid siting upon a pillow held her down; who during the fit, most strictly grasped the sick person, holding her to her bosom, with her arms foulded about her wast: besides servants were ready, and her relations standing by, who now press'd down her

her belly, and *hypochondria* riſing up, and ſwelling to a great bulk, now held her hands and arms. The chief Symptoms of the Diſeaſe, which being excited by turns, almoſt divided the whole fit, were theſe two, *viz.* one while Cruel Convulſions of the Bowells did infeſt her, ſo that the *abdomen*, riſing up into a mighty bulk, ſtrove againſt the hands of the by-ſtanders, held upon it, that it could not be preſſed down; and at the ſame time, her *Præcordia*, being contracted upwards, the motions of her blood and heart, were almoſt ſtop't: in which ſpace of time, this virgin, her head falling down, with a ſmall pulſe, and almoſt without voice, lay nigh ſenſleſs; after two or three minutes of an hour, theſe Convulſions ceaſed: and then the ſick perſon, ſetting her ſelf upright, look'd about cheerfully, and for a while, the force of the diſeaſe changed into talking and ſinging, both of which ſhe without ceaſing performed, moſt pleaſantly and moſt elegantly, beyond her proper capacity: with theſe kinde of ſpeeches, and pleaſant jeaſts, ſhe fell upon all the ſtanders by, that nothing in a Comedy could be more pleaſant; then ſhe utterd moſt ſweet tunes of muſick, and more pleaſant, than any other could, or her ſelf at another time: After ſhe had paſt ſix or ſeven minutes of an hour, thus jeſting and ſinging, the Convulſions of her Bowells and *Præcordia*, and the want of ſpeech, came upon her as before: and theſe ſoon remitting, the force of the Spirits leaping back, from the inferior nerves on the brain, it was laſtly imployed in the pleaſantneſs of ſpeech and Songs; as often, when ſhe talkt to the by-ſtanders, as any of them replyed any thing bitterly or reproachfully, ſhe fell into thoſe moſt grievous, and longer continuing, Convulſions of the *Viſcera*: After this manner, ſhe was wont to be moleſted, with an alternate diſtemper of the Bowells, and brain, about the ſpace of an hour: Then towards the end of the *Viſcera*, the fit declining, more light Convulſions being made, they repeated three or four times without auy intermiſſion, then theſe wholly ceaſing, the force of the diſeaſe brake forth into her outward members, from whence it quickly vaniſhed: for her Arms and Legs, for a minute of an hour, ſuffer'd leapings forth, and Contractions; preſently after, the ſick perſon being taken up, left ber bed, free from all Convulſion, till a new fit returned; yea, indifferently well in ſtrength, ſhe walk'd about the houſe, and during the interval of her diſtemper, ſhe cheerfully performed the accuſtomed Offices of Life, excepting that her ſtomack languiſhings all day ſhe loathed food, in the evening, after the ſecond fit, ſhe ſupp'd moderatly.

This was the preſent ſtate of the Diſeaſe, in whoſe fits, the more clear uſe of ſome faculties, ſeem'd in a manner to Compenſate the irregularity of others: But about the beginniug of her ſickneſs, it was ſomewhat otherways: for the Convulſions of her bowells, were far more grievous, and an inſenſibility was joyned to them: beſides, in their intervall, talking idly, an incongruons ſinging, yea both laughter and weeping, without any known reaſon, breaking forth, were wont to follow one another: but now, the animal Spirits being forced into longer exploſions, performed them ſo regularly, now this, now that, as a more Commodious way was made, that they ſeemed after a manner, to be done by the Command of the will, and of Reaſon.

The reaſons of the aforeſaid Diſtemper.

That we may therefore, according to our *hypotheſis*, frame an *Ætiology* or rational account of this Diſtemper; In the firſt place, it ſeems, that a vehement fear, did drive the Spirits inhabiting the brain and *Præcordia*, into great diſorders: ſo that, they being diſturbed out of their ranks, both the kinde of madneſs or fooliſhneſs, and the frequent ſwooning ſucceeded: Further, it may be ſuſpected, that from the ſame impreſſion, the hurt was carried to the brain it ſelf, ſo that its conformation being ſomewhat vitiated, the heterogeneous and morbific particles, were admitted together with the nervous juice: Then, although the ſpirits at the beginning, being confuſed and troubled, after their ſhort inordinations, at laſt recovered themſelves, and performed the wonted offices both of the animal and vital function; yet by reaſon of the taint, impreſſed on the brain, the heterogeneous particles being conſtantly admitted, cleaving to thoſe Spirits, induced exploſive endeavors, as ſoon as the ſpirits were filled to a plentitude, with the extraneous *Copula*, they being irritated, entred into Convulſive exploſions for the ſhaking or ſtriking it off.

About the beginning of the Diſeaſe, when both the Diſpoſition of the Brain,

and the Spirits inhabiting it, was more perverse, and vitious, from the fresh received hurt, a fullness of the heterogeneous *Copula* sooner happened, and so its explosion following more often, and more inordinately, was dispatched with greater tumult; But afterwards, when the hurt of the animal regiment abating, the supplements of that *Copula*, even as the nervous Liquor, were dayly brought in with an equall dimention, the explosions of the Spirits being made regular, and more milde, observed their just periods or set times.

That she felt, upon the approach of the fit, a fullness and as it were an inflation in her head, with an heavinesse, and dullness of the spirits, the Reason is, because at this time, the spirits inhabiting the brain, being now prepared for explosions, were wont first of all to be moved, and as it were to swell up; then that pulsation in her left *hypochondria* succeeded; for that the Spirits inhabiting the nervous foldings, and *fibres*, thickly planted about the Spleen, began to be exploded: afterwards, when the Spirits flowing both within the mesenteric, and Cardiac enfoldings, were exploded together, those elevations, and as it were leapings up of the *Abdomen*, and *Thorax*, were induced: and when in this distemper, the motions of the blood and heart were almost wholly stopped, therefore there was a small and almost no pulse, and she became Speechlesse, and in a manner sensless.

The Convulsion of the *Viscera* and *Præcordia* remitting, a pratling and singing succeeded, because a falling down or removal of the Spirits as yet exploded, being made from the nervous stock, into the brain, it changed the Convulsions into an exaltation of the fancy, and more ready exercise of the phantasms, or Representation of the Imagination: So long as the Spirits, within the middle of the brain, are regularly aud orderly exploded, they bring forth the Acts of the habits and faculties so much more noble, and as it were above the strength, and tenour of Nature, as in this sick Gentlewoman: but on the contrary, when the explosions of the Spirits in that Region, happen to be inordinate, they cause for the most part foolishness, or at least the exercise of their powers, are incongruous and absurd.

The Convulsions of the Bowels, and the phantastic actions, releiv'd one another mutually, and by turns, because plenty of Spirits, being disposed to be struck off, made their tendency, as it were with a direct and reflected waving or undulation, now on this part, now on that by turns: then lastly, when they were almost all exploded, the more often Convulsions of the *Viscera* were stir'd up; and when a small handfull only remained to be exploded, that being at last excluded, both from the head and bowells, it ran forth into the spinal marrow, and employed the last assolt of the disease, in the Convulsions af the Arms and Legs.

There yet remains one great difficulty in this Case, why the fits of this disease, were always repeated exactly at set hours, and yet had so unequall periods, to wit, that the Coming of the first, was only but six hours before the second, and then the return of the next, did not hapen but in 18 hours space. For the solving of this, it is to be supposed, that these fits did depend upon the nervous juice being stuffed to a plenitude, with heterogenious particles: which particles were altogether conveyed thither from the bloody mass, and the blood did drink up the same, from the nourishing juice, sent as a supply from the Bowells: These being thus supposed, we must consider, in what space of time, the bloody mass is filled with those morbific particles, and then, in what measure, it pours them forth into the nervous Liquor. As to these, that it may the better appear after what manner it was done, in the case of this sick person, you must know, that she took in 24. hours space, only at one time, a full meal: to wit, after the second fit was ended she supped moderately about 7 of the Clock; the rest of the day wanting an Appetite, she hardly took any food, therefore it is probable, that the morbific matter, was poured forth together with the nutritious provision, into the bloody mass, chiefly in the night time; and that more plentifully, than that all could presently be derived, into the nervous Liquor: The heterogeneous particles, which are first conveyed from the blood, newly satisfyed, into the nervous Liquor, being heaped up to the fulness, did excite the first fit, the coming of which therefore was longer delayed, because both one space is required wherein the blood, and then another wherein the brain and nerves, are to be filled: after this fit was over, because the blood yet full, containing in it self more

particles

particles, of the ſame kinde, pours them ſuddenly on the nervous juice, therefore the other fit is induced, within thrice the ſpace of the former: but this being ended, becauſe both the bloody maſs, and the nervous juice, are wholly freed from their burthen, the ſick perſon finding her ſelf better, than at any other time, took her food greedily enough; but after that, when to the next following fit, firſt the bloody maſs, and then the nervous juice, ought to be filled with the morbific matter, therefore 10. hours are required for this double task: but forasmuch, as there is only need, for the ſecond fit, that the other particles ſhould be derived from the bloody maſs, yet full, into the nervous juice, therefore for this effect, a much leſs ſpace doth ſuffice, *viz.* of 6 hours.

After I had ſeen this Lady, who had labour'd for many weeks with theſe kinde of periodicall fits, I order'd, that three hours before the ſecond fit, ten ounces of blood, ſhould be taken out of the vein on the foot; which being done, the coming of the fit, in the evening being expected, quite left her, neither did it return at all afterwards; but the other fit, obſerving its former time, dayly returned, till the Patient being let blood, a little before its coming, remained that day free from the diſeaſe, which however returning the day after, according to the ſame manner, exerciſed her for many months: In the mean time, becauſe the cold of the winter was very great, ſhe forbore for ſome time the uſe of remedies: but the ſpring coming on, this honourable Lady being brought to *Oxford*, was Cured by the following method. *The Curatory Method.*

Firſt I gave her this Cathartick, and I took care, that it was repeated every 6th. or 7th. day. Take of the *Sulphur of Antimony*, grains 6, of *Mercurius dulcis* 1. ſcruple, of the *Reſine of Julap* gr. iv. of *ginger* gr. vi. let them be beaten together in a morter, then adde of the *Conſerves of Violets* i. dram, make a *bolus*: It was wont to provoke two or three vomits, and three or four ſtools. The flux of her Terms came conſtantly in great abundance, at the ſet times: wherefore, when the blood ſeem'd very plentifull, and hot, I order'd *phlebotomy* twice or thrice in the midſt betwixt the times of her Terms: Beſides, every day that ſhe did not purge, ſhe took twice in a day, 4 pills of the following maſs, drinking after them, a little draught of the Julap below preſcribed. Take of the *Roots of the male-Paony*, ℥ ß. of *Virginian ſnakeweed*, *Contrayerva*, *Cretic Dittany*, each ʒ i i. of *humane skull*, prepared, ʒ i ß. of an *Elks claw* ʒ i. of *red Corral* prepared, of the *powder of Pearls*, each ʒ i. of the *ſalt of Wormwood*, ʒ ii. of the *ſalt of Corrall* ʒ i. with what will ſuffice of the *ſyrrop of the flowers* of the *male-paony* make a maſs.

Take of the water of the *flowers* of the *male-paony*, of *black Cherries*, and of *Wallnuts*, each ℥ iiii. of the antiepileptic of *Langius*, ℥ ii. of the *ſyrrop* of the *flowers of Paony*, ℥ i ß. of *Caſtor* tyed in a knot, and hung in the glaſs, ʒ i. mix them, and make a Julap.

When ſhe began to loath the Pills, they being omitted, ſhe took twice a day, to wit, in the Morning, and the Evening. about one ſcruple of the following powder, in a ſpoonfull of Julap, drinking after it 4. or 5. ſpoonfulls of the ſame. Take of *Bezar-ſtone*, of either *white Amber*, of *Pearls* prepared, of *red Corrall*, each ℈ i. of *humane skull* ℈ ii. of the root of *Virginian ſnakeweed*, and the *ſeeds* of *Rue*, each ℥ ß. mingle them, and make a powder, let her take ℈ i. Morning and Evening, with a doſe of the above-preſcribed Julap.

Then, when alſo this medicine began to be tedious to her, ſhe uſed the pills, or the *Elixir proprietatis*, and alſo ſometimes for many days the *Spirits of Hartshorn*: At laſt, ſhe began to be helped, by that powder, being daily taken, for ſome ſpace.

In the mean time, whilſt this method of healing was ordained; her hair being ſhaven from her head, it was covered only with a thin covering: She wore upon her Belly, an Hyſterical plaiſter mixed with *Galbanum*: for her ordinary drink, ſhe took a *Bochet* of *Sarſa*, and *China*, the *roots* of the *male-Paony*, and other proper things, infuſed in *Spring-water* and boyled. Within a month, the Fits were ſomething remitted: then, being by degrees made gentler aud leſſer, at length they almoſt quite ceaſed: unleſs that at the time of her Terms, one or two fits of the diſeaſe was wont to trouble her: Further ſhe labour'd with an almoſt conſtant giddineſs, and queaſineſs of Stomach; in the middle of the Summer, ſhe drunk *Aſtrop-waters*, for a fortnight, and was perfectly well.

But as for the means in generall, to be ſhown for the Cure, of theſe admirable

it will not be eaſie to aſſigne, either fit remedies for this herculean diſeaſe, or a certain method of Cure, approved by often experience : for beſides, that theſe like caſes are ſeldome met with, it is likewiſe obſerved, that the ſame Medicines which at this time were helpfull to this ſick perſon, being given to another, or to the ſame, helpt nothing at another time : The reaſon of which ſeems to be, becauſe the cauſe of the Diſeaſe conſiſts in the diſcraſie, or evill diſpoſition of the nervous juice, which Liquor, is not always perverted, after one and the ſame manner : But by the manifold combination of the ſalts and Sulphures, it gets a morbid nature of a various manner and kinde, and oft entimes changes it : wherefore, in the moſt grievious diſtempers of this kinde, not the vulgar medicines, taken from the ſhops or diſpenſatory, are to be preſcribed, but magiſtralls, as cauſe ariſes, according to the appearances of the admirable Symptoms. A gentle vomit, Purge, blood-letting, ought in the firſt place to be ordained, and to be repeated, as often as ſhall ſeem fit. As to ſpecifick medicines alſo, and appropriate in theſe caſes, when the chief Indication ſhall be, to mend the temper of the Nervous juice, you may try many, and by their effect judge of their virtues : Therefore it may be lawfull, to try, what the Remedies indued with a volatile or armoniac ſalt, may effect. For this end, the ſpirits and ſalts, of Harts-horn, Blood, ſoot, and the flowers and ſpirits of *Sal-armoniac*, are taken : Theſe helping nothing, you muſt come to Chalybiats or Steel medicines ; the tinctures and ſolutions of Corall and Antimony are given : which kinde of medicines are exhibited, in ſuch a doſe, and form, and ſo often, that ſome alteration may be made by them, on the whole blood or nervous juce : Further, If ſucceſſe ſhall fail in ſuch like, you muſt then proceed to *Alexipharmaca*, which help againſt poyſons, and the malignancy impreſſed on the humours : to wit, to inſtitute from theſe, decoctions, and diſtilled waters of vegitables, powders, Conſerves, and other preparations ; and to compound variouſly ſome with others, and to adminiſter them diverſly. It is likely, that thoſe kinde of medicines, which are wont to be helpfull to ſuch, as are bitten by a viper, or a mad Dog, or that have taken woulfs-bane, or poyſon, may be uſefull alſo in the aforeſaid Convulſions. It may be lawfull here, according to the example of *Gregory Horſtius*, in his tract of the malignant Convulſive diſeaſe, and alſo of wonderfull Convulſions, to preſcribe magiſterial Remedies, in the form of a purging Electuary, and alſo of a powder, and Convulſive Antidote, aud to compound them variouſly, partly of ſimple *Alexipharmacks*, or poyſon reſiſters, and partly of *Antiepilepticks*, or things good againſt the falling Evil.

CHAPTER. X.

Of the Paſſions Commonly called Hyſtericall.

THE hyſterical paſſion is of ſo ill fame, among the Diſeaſes belonging to women, that like one half damn'd, it bears the faults of many other Diſtempers : For when at any time, a ſicknſs happens in a womans body, of an unuſual manner, or more occult original, ſo that its Cauſe lyes hid, and the Curatory Indication is altogether uncertain, preſently we accuſe the evill influence of the womb, (which for the moſt part is innocent) and in every unuſual Symptom, we declare it to be ſomething hyſterical, and ſo to this Scope, which oftentimes is only the ſubterfuge of Ignorance, the medical Intentions, and uſe of Remedies are directed.

A deſcription of the hyſterical paſſion. The Paſſions, which are wont to be referred to this cenſe or order, are found to be various and manifold ; which rarely happen in diverſe women, or which come wholly after the ſame manner : The moſt Common, and which commonly are ſaid to conſtitute the formal Reaſon of the hyſterical diſtemper, are theſe, *viz.* A motion in the bottom of the belly, and an aſcention of the ſame, as it were a certain round thing, then a belching, or a ſtriving to vomit, a diſtention, and murmur of the *hypochondria*, with a breaking forth of blaſts of winde, an unequall breathing, and very much hindred, a choaking in the throat, a *vertigo*,

vertigo, an inversion, or rolling about of the eyes, oftentimes laughing, or weeping, absurd talking, sometimes want of speech, and motionless, with an obscure or no pulse, and deadish aspect, sometimes Convulsive motions, in the face and Limbs, and sometimes in the whole body, are excited: But universal Convulsions rarely happen, and not unless this disease be in the very worst state: Because, for the most part, the Tragedy of the Fit is acted without Contraction of the members, only in the inferior belly, *Thorax*, and head, to wit, in some of them, or successively in all: women of every age, and Condition, are obnoxious to these kinde of Distempers, to wit, Rich and poor, Virgins, wives, and widdows: I have observed those Symptoms in maids before ripe age, also in old women after their flowers have left them; yea, sometimes the same kinde of Passions infest men, as plainly appeared by the example already shewed.

The causes of the Symptoms inquired into.

As to the causes of those symptoms, most ancient, and indeed Modern Physitians, refer them to the ascent of the womb, and vapours elevated from it: The former opinion, although it plead antiquity, seems the less probable, for that the body of the womb is of so small bulk, in virgins, and widdows, aud is so strictly tyed by the neighbouring parts round about, that it cannot of it self be moved, or ascend from its place, nor could its motion be felt, if there were any: as to that vulgar opinion, or Reason taken from the vapours, we have often rejected it as wholly vain, and light, for just reasons elsewhere: But we judge, the passions but now described, do neither always, nor at all proceed from the ascent, or the vapours of the womb: and that indeed, other very famous Physitians, have already determined: For in times past. *Charles Piso*, and of late the most learned *Highmore*, have vindicated the womb from all fault; and the passions, which are commonly call'd hysterickall, are thought by this latter to arise from the blood, most impetuously rushing on the Lnngs; and by the other, from a serous colluives heaped together neer the *origin* of the Nerves. How probable this latter opinion doth seem, shall appear from what follows: But as to the opinion deliver'd by Doctor *Highmore*, concerning this thing, tho it be far from our Custom to contradict any ones opinion, and that it is almost unlawfull for me, to diffent from this famous man; yet, because our Pathologie standing on a contrary *basis*, (viz. the cause of the hysterickall distemper being imputed more immediately to the nervous stock, than to the blood) will seem to be only asserted, unless we shew the Reasons, which combat against that *hypothesis*, and fotours, therefore taking leave, here we will try more exactly either opinion, put as it were in a ballance.

Doctor Highmores Opinion Examined.

In the fit therefore commonly called hysterical, this famous man supposes, the blood, for that it is thin, flatulent, and with a certain effervescency, to rush too much in heaps, into the pneumonick vessells, and the vessells of the heart, and in them to broyl up impetuously, and so to stuff up the lungs, and very much to aggravate them, that neither they can exercise their motion, nor that the blood can be drained from the bosom of the heart: Hence, from the blood stagnating in the *Præcordia*, a great oppression, difficult breathing, and often none, with a melting of the vital Spirits were wont to be inferred: then the *diaphragma*, that it might give place to the Lungs more and more distended, and that breathing at least might be some way made, is carried downward, with a mighty and long continued *Diastole*, and so by pressing down the Intestines, it lifts up the *abdomen*, and *hypochondria*, and feins a motion as it were the arising of a globe: But afterwards, the vital function labouring after this manner, the animal faculty arises in its aide, wherefore, a necessity of motions, in various parts urging the animal Spirits, being driven impetuonsly into the beginnings of the nerves, produce divers manners of Convulsions, running here and there. The Author endeavours to confirm this Opinion, by the great help in this disease had, by the taking away the bloody excretion, both from things helpfull, and things hurtfull, in this paffion.

But though I cannot but praise this Doctrine of the suffocation of the womb, as very ingenious, and cunningly wrought, yet that I do not consent to it in all things, some reasons of great moment clearly hinder me. Truly I confess, that I do not understand, how in some hysterical persons, to wit, who are of a more frigid temperament, and are often troubled with the Pica, and longing disease; the blood should so immoderatly boyl up in the Lungs, without any conspicuous

notes of its growing hot, in some other place. I have known young maids, by reason of the green-sickness, as it were without blood, to wit, whose blood indeed being without life, did remain without any exercise in the heart, and was from thence diffic ltly enough drawn forth, into the Lungs, who yet were grievously obnoxious to the passions called hysterical: Certainly it is not probable, that the blood of these persons growing immoderatly hot, should rush impetuonsly into the Pneumonick vessells, and should stuff up their pores and passages very thickly, when in the mean time, such become short-breath'd, by reason of the absence of the blood from the Lungs, or its difficult admission to them: Besides, by what means comes it to pass, that this violent course of the blood into the Lungs, which is supposed to be made in this Fit, brings forth no Inflammation in them? for that the blood, being too much heaped, or rapidly put into any part, is easily extravasated, and is wont to excite an Inflammation hardly to be shaken off. From whence it is therefore, in the hysterical distemper, the blood entring violently into the Lungs, and distending them, does not cause a peripneumonie or Impostume of the Lungs? Or wherefore the distempers as it were hysterical, come not on an Inflammation of the Lungs, otherwise caused? wherefore it seems improbable, that the blood swelling up, with its proper anger or heat, should rush into the Lungs, and by stuffing them, renders them too immovable, and so secondarily and consequently induce Convulsions of the *Diaphragma*, and other parts: but it may rather seem, that by reason of the *Diaphragma*, and other organs of breathing, being first affected with a Convulsion, the blood should be forced to stagnate in the *præcordia*: Besides, it may be observ'd, that the Lungs are not always afflicted before other parts; for oftentimes the convulsive Symptoms begin elsewhere, and not rarely bear the region of the breast wholly untouch'd: Because in some, the *vertigo*, and Corruscations or sparklings of the eyes, begin the fit, to which succeed either weeping, or laughing, or convulsive motions of the Limbs, without any straitness of the breath, or oppression of the heart: in others, before respiration troubles them, any way, a swelling in the bottom of the belly, with a vomiting, and rumbling of the belly, begins and often ends the fit; so that the difficulty of breathing, oftentimes follows these Symptoms at a great distance, and is wont to be prevented, by the tying strictly of swathing-bands, about the *hypochondria*. Moveover, it seems, that this ascent as it were of a certain round thing, from the *Hypogastrium* or lower part of the belly, can never proceed from the depression of the *Diaphragma*; because in the hysterical fit, this part is not always pressed down towards the lower parts, but oftentimes drawn up to the higher parts, and drives the Lungs upwards, so that the spirit or breath being almost shut forth, threatens the danger of Choaking. By these, and other reasons, we are at length perswaded to that opinion, that the distemper named from the womb, is chiefly and primarily convulsive, and chiefly depends on the brain and the nervous stock being affected, and whatever inordination, or irregularity from thence happens, about the motion of the blood, is only secondary, and is made dependingly, by the Convulsions of the Bowells.

The hysterical distemper chiefly belongs to the Brain and nervous stock.

But that this doth consist within the bounds of the head, both the comparing of the symptoms, which happen in the living, and the anatomical observations of the dead, clearly shew; because we may observe, that this distemper often takes its rise, from a sudden fear, great sadness, or anger, or other violent passion, in which the spirits inhabiting the brain are chiefly affected besides, to some an ill manner of dyet, and varions accidents whereby the humours being vitiated, are heaped more plentifully within the head, at first brings this evil. Yea, the manner of the fits clearly evinces the same, forasmuch, as a fullness of the head, a *vertigo*, a sparkling of the eyes, a ringing noyse of the ears, begin in many the hysterical fit, and often conclude it: Besides I have opened some women, dead of other diseases, tho while they were sick, very obnoxious to hysterical passions, in whom the womb being very well, I have found in the hinder part of the head, the beginnings of the nerves, moistned and wholly drowned with a sharp *serum*, as shall be more largely declared anon.

Having weighed these, and other Reasons, we doubt not to assert, the Passions commonly called Hysterical, to arise most often, for that the animal spirits, possessing the beginning of the Nerves within the head, are infected with some taint;

taint; to wit, they being either acted or brought into Confuſion, or being tinged with vitious humours, get to themſelves an heterogeneous and exploſive *Copula*, which they carry far away with themſelves, into the Channells of the nerves: and when the ſame ſpirits are filled to a plenitude, with that *Copula*, thorow all their *ſeries* or orders, either of their own accord, or being occaſionally moved, they enter into exploſions, and ſo ſtir up Convulſive motions: But that ſuch a *Copula* adhering to the ſpirits, is chiefly derived together with them, into the interior nerves, the reaſon is, becauſe in this paſſage towards the *præcordia*, and *viſcera*, the animal ſpirits, by reaſon of the diſtemper of the minde, are very much diſturbed; wherefore, they more eaſily admit any evills brought from another place, and more readily conceive irregularities. For the animal ſpirits, chiefly for this occaſion, contract a convulſive diſpoſition: foraſmuch as they, from a violent impreſſion, are perverted out of their Courſes, and their wonted manner of Influence, and acting; hence they not only repeat their inordinations, but alſo receive the heterogenious particles into their embraces, and more eaſily combine with them: Wherefore, foraſmuch as the animal ſpirits, running thorow the nerves of the wandring pair, and Intercoſtals, are continually entangled with all perturbations both of the Concupiſcable, and iraſcible Appetite, it is no wonder, if they acquire a convulſive diſpoſition, before the reſt.

The cauſe of the diſeaſe, moſt often begins, about the beginnings of the nerves.

It being ſuppoſed (which indeed ought to be ſuppoſed) that the animal ſpirits have contracted an heterogenious and exploſive *Copula*, now the nervous *origines*, and carried it together with it ſelf into the interior nerves, and ſpread it thorow all their paſſages, it will not be hard to aſſigne the Reaſons of the hyſtericall fit, and of all its Symptoms. For firſt of all, the diſeaſe being ready to fall upon one, oftentimes the *Vertigo*, a rolling about of the eyes, and a certain inflation of the brain, as it were prævious skirmiſhings, are ſtirred up, becauſe the whole band of the Spirits, being in readineſs for exploſions, the more light companies of them, leaping back towards the brain, are firſt ſtruck off; then Preſently a perturbation ſucceeds, in the bottom of the belly, or *hypochondria*, for that the Spirits within the enfoldings here and there, are next diſturbed: For we have elſewhere ſhown, if at any time the animal Spirits are exploded, in a certain whole *Series*, thoſe which abode in the extream parts, firſt of all enter into that aſſertion: Wherefore the beginnings of this Diſeaſe, are found to be or the moſt Part, in the head and Bowells: but that the Convulſions are firſt perceived, now in the bottom of the belly, now in the *hypochondria*, the reaſon is, becauſe the morbific matter, is ſometimes carried by the paſſage of the intercoſtal nerve, into the utmoſt meſenteric enfoldings; but ſometimes the ſame, being ſlid down, not beyond the ends of the wandring pair, ſubſiſts much neerer, to wit, about the enfoldings of the ſpleen, or ſtomack.

The ſame cauſe afterwards diſpoſed, thorow the whole paſſage of the Nerves.

When therefore the animal Spirits (as hath been ſhown) within the nervs of the wandring pair, and intercoſtals, are imbued from their *origine*, even to their utmoſt ends, with an heterogeneous and exploſive *Copula*; they at length, either from mere fullneſs, or by an irritation ſomewhere made, are ſtirred up to exploſions; in which affection, if any Spirits leap forth towards the middle of the brain, they induce the *Vertigo*, the inflation and other prævious accidents of the head: but the Spirits inhabiting the other extremity of the nervous Trunk, *viz.* the meſenteric enfoldings begin chiefly to be exploded, which preſently by their letting off, compell the lower Parts of the *hypogaſtrum* to be lifted up, and contracted upwards, and ſo induce the aſcention of a certain bulk, as it were of the womb: then, when the upper parts of the enfoldings of the meſentory, are by degrees intangled with the ſame diſtemper, and the bowells annexed to the ſame are elevated, and drawn forceably towards the upper parts, the violent ſwelling of the *Abdomen*, as it were with a certain leaping forth ſucceeds: Further, the Ventricle is not only elevated, by changing its place, all its *fibres*, to wit, the direct, oblique, and tranſverſe, being affected at once, with the Convulſion, is often diſtended like a blown bladder: hence very often vomiting, or at leaſt a rumbling, and murmur of the *hypochondria*, are excited: but as ſoon as the Spirits being exploded, with a certain *ſeries*, it comes to the Region of the *Thorax*, the *Diaphragma* being drawn together, with an huge diaſtole is ſometimes depreſſed, and ſo meeting with the aſcention of the *viſcera*, cauſes an Inflation, and high intumeſcency or ſwelling up, with a mighty ſtrugling; ſo that the

The reaſon of the hyſterical ſymptoms unfolded.

the laces of thoſe in this diſtemper, muſt be forthwith looſned, or elſe they are in danger of falling into a trance: In the mean time, the *Diaphragma* being ſo depreſſed, and its diaſtole continued, the bloud remains almoſt immovable in the *præcordia*: and ſo by its ſtagnation, cauſes a great oppreſſion, and very often a failing of the vital function: Further, the Convulſion of the *Diaphragma*, happens ſometimes towards the upper parts, and ſo, that driving the Lungs upwards induces a violent Syſtole, and protracted longer than it ſhould be; and when by this means, the blood is driven forward, into the pneumonic veſſells, and is not at laſt received from the boſome of the heart, it ſtagnates there, and beſides in the whole Body; from whence the oppreſſion of the heart, and oftentimes a ſwooning, yea ſometimes a want of ſpeech, and motion, now with a blewneſs of the face, and now with a dead aſpect follow: After theſe things are acted in the lower, and middle Region, at length the diſtemper reaches to the head, by the paſſage of the nerves, as it were a fiery inkindling, and the ſpirits being there exploded leaping now towards the middle of the brain, produce a ſwimming in the head, and often ſymptoms very like the *Epilepſy*; ſometimes the ſpirits there exploded, ruſh into the beginnings of the other Nerves, and there ſtir up the like exploſions; wherefore, hyſterical people, towards the end of the fit, often Laugh, or weep, or talk Idly; ſometimes the parts of the face, and mouth, yea, ſometimes the arms, and other members, are troubled with convulſive motions, and ſo, when at length all the ſpirits, which had contracted an heterogeneous *Copula*, are exploded, the fit ends; but preſently after, matter for another fit, begins to be gathered together.

From whence the diverſity of the ſymptoms happens.

It ſometimes happens, that the convuſive diſpoſition is not drawn out ſo long, and largely, for beſides that oftentimes the nerves only of the wandring pair, and the intercoſtalls are troubled with it, that neither the brain, nor the outward members, are at all moleſted; yea ſometime, neither the interior nerves themſelves, are poſſeſſed with the morbific cauſe, thorow their whole proceſſes: for the convulſive Diſpoſition (as we but now intimated) oftentimes arrives not beyond the enfoldings of the ſpleen, or ſtomack, and then the fit beginning from the inflation of the *ventricle*, or left *hypochondrium*, is thought to ariſe, not from the fault of the womb, but of the ſpleen: which kinde of diſtemper, by and by being brought to the Thorax, and there involving the *Diaphragma*, and Lungs, with a Convulſion, ſtops reſpiration, and the motion of the heart, or in ſome manner perverts it: but then from thence, the fit paſſes over; now with, and now without a great perturbation of the Head. Theſe things happen indeed after a various manner, according as it happens, that the morbific matter, or exploſive *Copula*, deſcending from the head, is gathered together, as it were heaps of gun-powder, more or leſs, now in this, now in that part! But concerning which matter, by what means, the ſame being brought forth in the head, firſt affects the beginnings of the nerves, and ſo conſtitutes the procatartick, or more remote Cauſe of the paſſion called Hyſterical, now remains next to be inquired into.

The more remote Cauſe of the diſeaſe ſubſiſts, either nigh the beginnings of the Nerves.

As to the morbific matter or exploſive *Copula*, which cleaving to the ſpirits, flowing within the head, and with them derived into the nervous paſſages, is often the cauſe of the diſtempers, commonly termed of the Womb; we ſay, that this, as in other kinds of Convulſions, is the heterogeneous particles, poured forth from the blood, which yet are wont to be affixed to the ſpirits, flowing into the beginnings of the nerves, cheifly for two cauſes: to wit, either by the fault of the ſpirits themſelves, or by the force of the matter it ſelf, inſtances of either kinde, are ordinarily met with. It ſometimes happens, that the animal ſpirits, planted within the brain, and in the paſſage leading from it, to the *præcordia*, are very much diſturbed, by a ſudden paſſion, as of fear, anger, ſadneſs, *&c.* And forced into diſorders; and that by that means, they being driven out of their orders, do acquire to themſelves heterogeneous particles, whereever met with; and combine with theſe, that by and by, for that reaſon, they acquire an exploſive diſpoſition, as we have already declared. Further in the ſecond place, ſometimes the morbific matter it ſelf, being made more fierce and ſtrong, in ſpite of the ſuccour of the animal *Æconomie* or rule, is poured forth into the brain, and its appendix, from the bloody maſs, which cleaving faſt to the ſpirits, preſently diſpoſes them into exploſions: This is ordinarily diſcerned

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in the evil criſes of feavours, alſo in ſome malignant diſtempers, alſo in Scorbutic and other Chronical diſeaſes ill cured. An ill, or weak conſtitution of the brain, or nervous ſtock, whether it be hereditarie, or acquired by reaſon of an ill manner of living, very much cheriſhes theſe cauſes. For in bodies ſo diſpoſed, both the animal ſpirits, from every light occaſion, are moved in Confuſion ; and the paſſages of the brain, and nervous *Syſtem*, more eaſily lye open, for the running in of the heterogeneous, and exploſive matter. In truth, for this reaſon, women are more obnoxious to convulſive diſtempers, than men, and ſome women then others, as we will ſhew more largely hereafter.

But altho theſe kinde of paſſions of women, called hyſterical, moſt often proceed from the fault of the head, or from the morbific cauſe, arifing within the *Encephalon* ; yet ſometimes, ſuch diſtempers are ſtirred up, by reaſon of a Cauſe beginning ſomewhere elſe, *viz.* Now in the womb, now in the other Bowells ; and of this Convulſive Pathologie, there are chiefly two heads, *viz.*

Or near the womb, or other Inwards.

1ſt. Sometimes it happens, that a Tumour, or an ulcer, or a congeſtion of ſharp humours, ariſes in the membranous parts, about the womb, or planted about the other *Viſcera*, and often irritates the parts ſo diſtemper'd, by reaſon of the breaking of the union, into painfull Convulſions : then foraſmuch as the animal ſpirits, placed round about, and thoſe inflowing, are moved iuto frequent diſorders, they at length, getting to themſeves heterogeneous particles, ſent either from the diſtemper'd part, or from ſome other place, are diſpoſed to convulſive aſſaults, and when firſt of all, the convulſive motions happen only in the neighbourhood of the affected place, to wit, that the bulk aſcending in the lower part of the belly, or its ſwelling up be only perceived ; afterwards they are propagated by the paſſage of the nervous bodies, and by the conſent of the convulſion there begun, leaſurely into the other *viſcera*, of the lower belly, then to the *præcordia*, and laſtly into the head it ſelf ; and the diſtemper, being thus by little and little delated to the ſpirits inhabiting the brain, they moreover having gotten in their proper Sphear, an heterogeneous *Copula*, retort the ſame back to the *viſcera*, and ſo the morbific cauſe, being made reciprocall, is begun at either end of the nervous Trunk. Some time paſt I have ſeen a noble virgin, in whom a ſmall Tumour ariſing, with moſt cruel pain, below the *Os pubis*, did ſtir np huge Convulſions ; firſt in the lower belly, and afterwards aſcending to the *Præcordia*, and head, were at length ſtretch'd to the outward members : for once or twice in a day, after that great pains did torment her in the affected part, the *abdomen*, and by and by the *hypochondria*, were wont to be lifted up : then difficulty of breathing, on an Inſenſibility ſucceeded, and preſently the diſtemper being brought outwardly, moſt horrid Convulſions, and Contractions of the members, and Limbs followed. Sometimes it alſo happens, that convulſive ſymptoms are induced in Child-bearing women, by reaſon of ſome hurt or evill brought to the womb : *Harvie* Relates, that wonderfull convulſions were cauſed by the injection of ſome ſharp thing into the womb : So ſometimes, tho rarely, it happens, that a morbific matter or exploſive *Copula* is fixed to the ſpirits dwelling about the extremities of the nerves and near the womb, immediately from the place there affected and without fault of the brain.

This laſt happens after a twofold manner.

Either by reaſon of the diſſolution of the union.

There yet remains another caſe, or manner of affecting, by which the convulſive diſpoſition is produced from the fault or the parts, lodg'd at a great diſtance from the brain (tho in the mean time, the taint, which is the cauſe of this diſtemper, is often mediately communicated to the brain it ſelf) to wit, when at any time, the nervous juice is hindred ſomewhere, in its motion or circulation, from thence ſtagnating in the nervous parts, and loading them, does often bring in a convulſive diſpoſition : So, when ſome uſual Evacuation, whereby the ſuperfluities of the nervous Liquor, were wont to be ſifted forth, is ſtopp'd, as from Iſſues ſuddenly ſhut up, or old ulcers dryed up without a purge, many fall into convulſive diſtempers : Yea, it may obtain here ſome place, what is wont commonly to be noted for a cauſe, of the hyſterical paſſions, in maids and widdows, to wit, the untimely reſtraint of the ſeminall humour, which ought to be beſtowed about the pleaſure of *Venus* ; at leaſt, if they receive help from the ſtate of a conjugal Life, it therefore happens, becauſe the reſtagnations of the nervous humour, which often fix a taint to the brain and nervous ſtock, by this means are prevented : Moreover, the nervous juice flows back towards its begin-

2. *Or by reaſon of an obſtruction of the Nervous juice.*

ning, becauſe its paſſage is ſomewhere ſhut up, by a ſwelling or cancrous Tumour. Laſtly in this City, a notable inſtance of this kinde of diſtemper hapned, *viz.* A certain maid of 12. years of age, had contracted an *hernia* or burſtneſs, hence by the order of her Mother, ſhe wore a truſs ill fitted, for a fortnight, not without great pain aud torment, a little hard knot much preſſing upon the *glandulas* of the Groin : within this ſpace (when before ſhe was perfectly well) ſhe began to complain of a giddineſs and heavy dulneſs of her head ; and ſo a little after, ſhe felt convulſive, and as it were hyſterical diſtempers, frequently falling upon her ; rogether with it great ſwellings aroſe behinde her ears, and in her neck of the ſame ſide, to which ſhe was never before obnoxious in all her liſe. It is not to be doubted in this caſe, but that from thoſe *Glandulas*, which are the Emunctuaries, or ſinks of the nervous Liquor, being too much preſſed together, the ſuperfluities of that humour, wont to be ſent away from thence, by the Lymphatic veſſells, reſtagnating in the head, brought forth thoſe evills : becauſe the ariſing of the aforeſaid ſymptoms, ſo ſuddenly and manifeſtly followed, upon the wearing of that Truſs upon the Groin, that even her Mother laid the cauſe of the Diſeaſe, upon that occaſion. Beſides alſo I have obſerved in others, the recrements of the nervous humour, being ſomewhere ſtopp'd in their Courſe, reſtagnating towards the head, have not only brought in convulſive ſymptoms, but from thence the *Kings Evill*.

Objections againſt the aforeſaid hypotheſis anſwered.

So much for the formal Reaſon, of the different original of the diſtemper, called hyſterical ; as alſo of the *genuine* Cauſes, of its ſymptoms : Out of which, it ſeems to appear plainly, that thoſe paſſions, do not depend always on the womb, but much more often, on the fault of the brain, and of other parts of the nervous ſtock : But many things are objected againſt theſe, which according to the old opinion, caſt all the blame on the womb : To wit, it ſeems ſo to be done becauſe the aſſault of this diſeaſe invades almoſt only women ; yea and women that are not well about their womb, *viz.* Child-bearing women, or ſuch who have their courſes ſtopt, are chiefly obnoxious to it : Beſides it may be argued from things helpfull for it, becauſe a plaiſter worn upon the lower part of the belly, alſo a ſtrict girding of the belly, and *hypochondria*, by which the aſcent of the womb may be hindred, do not ſeldom drive away the fit, juſt falling on them ; this alſo ſhews it, that ſweet things held to the noſe brings on the fit, and ſtinking things drive the ſame away, it is ſaid to happen quite contrary, if the ſame things be laid to the belly, or privy member.

That we may wipe off theſe objections, we ſay firſt, that the ſymptoms, which ſeem hyſterical, do not only happen to women : for we have ſhown already, by the hiſtory brought by us, that a certain man has been obnoxious to thoſe kinde of fits, with the aſcention of a bulk in the bottom of the belly : but that women are much more often troubled with thoſe convulſive diſeaſes than men, two reaſons may be ſhown, *viz.* Firſt, for that their animal conſtitution is much weaker : to wit, they have the brain and nerves ſofter, and of a leſs firm texture, that they are not able to ſuffer any thing ſtrongly, or to reſiſt every injury ; alſo the animal ſpirits in them, being more prone to flight and diſtraction, more eaſily admit an heterogeneous and exploſive *Copula* : from hence Women, from any ſudden terror or great ſadneſs, fall into mighty diſorder of ſpirits, when men from the ſame occaſion, are ſcarcely diſturb'd at all. Secondly, women more readily receive the convulſive diſpoſition, becauſe they gather a more plentifull heap of the morbific matter : for that, whilſt they lead for the moſt part a ſedentary Life, the blood, for want of ventilation, becomes more impure ; beſides in this ſex it originally abounds with heterogeneous and fermentative particles ; wherefore it is convenient for it, to be more often purged, by the flux of their Courſes ; by which notwithſtanding, not always what is extraneous, and incongruous, is wholly caſt forth, from the bloody Maſs, but that there remains, that which being poured on the brain, and its appendix, as occaſion is given, becomes the cauſe of the convulſive diſtemper : Moreover, when the menſtrual flux, being ſtop'd, a convulſive diſpoſition is occaſioned, it is not therefore to be thought, that ſuch a diſtemper is rais'd up from the womb, but that the bloody maſs, being more than uſually imbued, with heterogeneous particles, carries them, together with the nervous juice, to the head : yea, chiefly for this reaſon alſo, child-bearing women, are found obnoxious to the paſſions,

paſſions, as it were hyſterical, for beſides that the membranes of the womb being hurt, a convulſion there begun, by reaſon of the felt trouble, creeps upwards and is at laſt communicated to the head; it moſt often happens, that the blood being infected, by the termes being retained, grows hot with a feavouriſh burning, and then inſtead of a *criſis*, the malignant infection, is carried to the brain, from whence convulſive, and not ſeldom ſoporiferous, or ſleepy diſtempers, are excited.

But that it is argued, that this diſeaſe ſeems to be hyſterical, becauſe Remedies applyed about the *abdomen*, often bring help; it will be eaſy to ſhew, that the morbific cauſe planted in the meſentery, oftner than in the womb, is ſometimes either taken away by that means, or reſtrained from its Influence: beſides, the ſame kinde of applications, about the *hypogaſtrium*, are no leſs profitable, altho the original of the diſtemper, be derived from the head it ſelf: for we have ſhewn before, that when the heterogeneous, and exploſive matter, deſcending from the head, brings a convulſive diſpoſition, to the ſpirits diſpoſed within the whole proceſſes of the interior nerves; the convulſive motions therefore excited, begin from the extremities of the nerves, and ſo creep upwards towards their beginnings; ſo that firſt of all the *viſcera* of the lower belly, then the *præcordia*, and laſtly the brain it ſelf are affected; but if the outmoſt ſpirits, *viz.* thoſe dwelling in the enfoldings of the meſentery, be reſtrained from entring into exploſions, all the reſt, in the remaining nervous paſſage, continue in their orders: and this, plaiſters worn upon the navel, do often effect: for they repreſs, and compel into order, with their odour, the ſpirits from leaping forth; yea alſo, not ſeldom, they ſhake off and drive away, the *Copula* cleaving to them: wherefore, when the exploſions there about to be made, are reſtrained, the convulſive fit is wholly prevented: which yet is more apparent, for that, if the Convulſion begun in the lower belly, and from thence aſcending like a Globe, be preſently ſuppreſſed, and by a ſtrong binding together of thoſe parts, it be hindred that it creep not upwards, oftentimes the convulſive paſſion is broken off, the *præcordia*, and the brain being untouch'd: wherefore it is a common cuſtome, for ſick women, to binde ſtrictly the *Epigaſtrium*, with ſwaths or rolers, and ſo to ſtop the progreſs of the ſymptoms, towards the upper parts: For when the animal ſpirits, enter into Convulſions ſucceſſively, as it were a fiery enkindling, whereever the tinder, or cheriſhing matter is cut off, or intercepted, the diſtemper is there reſtrained.

As to the various effects of odors, to wit, that ſweet things bring on the fit, but ſtinking things drive the ſame away, it may be ſaid, that the former do looſen the animal ſpirits, by pleaſing them, and too much releaſe them from their wonted tasks of Influence, and ſo provoke them ready to be exploded, in ſuch diſorders, yea and as a flame put to them, do ſomewhat inkindle them: but on the contrary, ſtinking things repreſs the ſpirits, drive them back from excurſions, and exorbitances, and compell them into order, yea like ſulphur, mixt with *aurum fulminans*, take away from them their exploſive force.

What we have hitherto ſaid, of the paſſions called from the womb hyſterical, will yet more clearly appear, if for the Confirmation of our *Hypotheſis*, we ſhall add arguments taken from anatomical obſervations; I will therefore lay before you a notable Caſe, by which the former reaſon, and Cauſes of the convulſive diſtempers, may be very much illuſtrated.

Obſervation. A very noble Lady of a moſt curious ſhape, and highly indued with a virtuous diſpoſition, of minde and manners, of late lived near to this place, who being for many years obnoxious to convulſive diſtempers, for that ſhe had originally, or hereditarily contracted this ſickly diſpoſition, and had experienc'd the fruits of this morbid ſeed, almoſt every luſtre of her age, but chiefly as often as ſhe was with child, (for ſhe very frequently miſcarried) was wont to be tormented above meaſure, with convulſive paſſions, as it were hyſterical; becauſe, preſently after the reſtraint of her monthly flowers, the heterogeneous particles being tranſlated to the brain and nervous ſtock, cauſed fits of this moſt cruell diſtemper.

After ſhe had newly conceived, in the firſt months, according to her old cuſtom, ſhe was preſently moleſted with convulſive diſtempers; about the nineth week of her big belly, from taking cold, ſhe fell into a dangerous feavour, in which very

acute pains tormenting her, in her loyns and bottom of her belly, for many days, ſeem'd to threaten an abortion: but theſe pains, as the event ſhew'd, rather to be termed Colical, proceeded from a ſharp humonr, falling down into thoſe parts, from the brain, by the pipes of the nerves; for towards the declining of the feavour, this matter being ſomewhere elſe tranſlated, a great looſneſs or Diarrhæa, pains of the feet, and as it were an ulcerous diſpoſition ſucceeded.

As ſoon as this Lady became well from her feavour, and thoſe pains, the convulſive diſtempers returned, for every morning, wakeing from ſleep, ſhe was wont to ſuffer Convulſions, and cruel contractions, about the parts of her face and mouth, as alſo in her armes and thighs; which ſymptoms, without doubt, did ariſe from a ſerous heap or gathering, laid up in the head, about the beginnings of the nerves; and by them imbibed, together with the nervous juice, more deeply in ſleep; and when afterwards the ſame matter, was carried by the pipe of the interior nerves, into the foldings of the Meſentery, aud loyns, moſt cruel pains of thoſe parts, and alſo fits as it were hyſterical, did moſt grievouſly infect her.

But theſe convulſive motions of her face and members, after a little time ceaſed, but yet ſhe ſtill remained weak, and without ſtrength, with a pale countenance, an inſirm and trembling gate, and deſirous only of congruous food, and hot Liquors: about the end of the third month, at which time ſhe was wont continually to miſcarry, her *menſtrua* broke forth, which coming away for two or three days together, with little pieces of broken membranes, ſhe expected to miſcarry: But that flux ceaſing, pains as it were of one in labonr, in her *abdomen* and loyns, as before aroſe, and for the ſpace of a week, tormented her day and night; at length, having uſed a bath of *Emollient* herbs, and afterwards put to bed to ſweat, ſhe brought forth the burthen of her womb: the conception ſo coming away with mighty pain, was about the bigneſs, and like the figure of a Turkie egg: the exterior coat of it was torn and broken, the interior remaining whole, contained about half a pint of clear water and nothing elſe beſides; there appeared no ſhape of a childe, or any rudiments that it would ever be one: Afterwards for 4. or 5. days, her flowers flowed forth, with ſome pieces of broken membrances: in the mean time, pains with their wonted fierceneſs tormented her, and when the ſpace of a week being elapſed, they left not off of themſelves, remedies at length were ſought to allay them.

To this end, firſt Liniments, Fomentations, Baths, and Clyſters, were often adminiſtred; alſo medicines purging the filth of the womb, on which the cauſe of all the evill was caſt, were taken inwardly: Short intermiſſions of her tortures, followed upon the uſe of the former; but then the diſtemper returned, with great trouble; yea the diſeaſe much increaſing, in three weeks time, got many other horrid ſymptoms: for beſides the pains in her belly and loyns, which became more cruel every day, alſo ſhe was ſhortly after tormented in her back, neck, ſhoulders, as alſo in her arms and thighs, with moſt cruell pain; and that more bitterly, as ſoon as ſhe was warm in her bed; beſides, ſhe was afflicted with a frequent giddineſs, vomiting, and nauſeouſneſs, and often in a day, with moſt grievous convulſive fits, *viz.* Firſt a bulk was ſeen to aſcend in the bottom of her belly, and preſently it lifted up her whole belly forceably, by and by reſpiration being reſtrained, an Inſenſibility, with a dead countenance ſucceeded: after that, ſhe had thus lain as one dead, for three or four minuts of an hour, ſhe was wont ſuddenly to leap up, that ſhe could hardly be held down, or kept by thoſe ſtanding by; then follow'd cruell contractions, and diſtortions in all the parts of the mouth, and face, as alſo in all the members of the body: Theſe ſymptoms were indeed judg'd to be hyſterical, becauſe this noble Lady ſo lately had miſcarried.

But weighing every one of theſe, I was at laſt of this opinion, that the cauſe of either fit, *viz.* Both the *dolorifick*, and the convulſive, did depend wholly on the evill affection of the brain, and nervous ſtock, and that without any fault of the womb; for that a ſharp humour, being heaped up within the head, did from thence deſcend thorow the paſſages of the Nerves, into parts at a great diſtance; which lodging upon the membranes and *fibres*, and fermenting with the humour, flowing in from the bloody maſs, did irritate them very much, and ſo ſtir'd up moſt cruel pains: Then afterwards, when the heterogeneous and exploſive particles,

ticles, being admitted with what humour within the head, and entring into the nervous paſſages, did cleave to the ſpirits; therefore the convulſive diſpoſition, then breaking forth into grievous fits, was induced, as ſhall be by and by more largely laid open.

Inſtituting Curatory Intentions, according to this kinde of *Ætiology*, I order'd to have blood taken from this ſick Lady, at what time ſhe moſt grievouſly laboured, out of the *Saphena vein*, and within two days, to be given her a gentle Cathartick, and that to be reiterated, once or twice in a week: Alſo on other days, Morning and Evening, I gave her ſpirits of *Harts-horn*, and at other hours, twice or thrice in a day, of the *powder of Pearls* and *Crabs-eyes*, with a doſe of the following Julap. Take of the *water of Snails*, and of *worms magiſterial* each ℥iii. of *Saxifrage*, and *black cherries* each ℥ iiii. of *hyſterical water* ℥ ii. of the *ſyrrop of Corralls* ℥ i ß. of the *tincture of Coſtor* ℥ i. mingle them: The bath of ſweet herbs was frequently uſed, when neceſſity urged, ſhe took *Opiats* always with good ſucceſs: *Veſicatories* were applyed to the inward part of either thigh, alſo to the hinder part of her neck; alſo *Fomentations*, *Oyntments*, *Clyſters*, *Cuping-glaſſes*, *Sneezing-powders*, with many other manner of adminiſtrations were preſcribed, according to the exigences of the ſymptoms.

By this method obſerved for about 14. days, the noble Lady having received very much eaſe, was wholly rid of her convulſive fits. Yea, the torments of her Bowells and members, and the other ſymptoms being very much leſſen'd, ſhe hoped quickly to recover her health: But after this, partly by reaſon of an ill order of dyet, which the ſick Lady always indulg'd her ſelf in, or taking little, but chiefly, by reaſon of a ſudden paſſion of fear and ſadneſs, which an unluckie accident hapning within her own houſe, had cauſed, ſhe fell into a relaps, by and by the diſeaſe growing into a much worſe Condition, for both the Convulſions, and pains, did infeſt her more bitterly; yea and her ſtomach being almoſt tyred out, with continual vomiting, would not admit either of food or medicines. She took Aſſes milk for ſome days, with ſome ſucceſs; which notwithſtanding, for as much as breeding Choller in her ſtomach, ſhe found it troubleſome, ſhe ſhortly omitted: at length in ſpite of all Remedies, preſcribed carefully by the Conſultation of many Phyſitians, my noble patient from day to day grew worſe, and by degrees death approached: Two days before her death, the torments of her belly and loyns very much abated, and ſhe became more than uſually chearfull, and conceived ſome hope of Recovery; But in the mean time ſhe complained of a pain and great heavyneſs in her head; and about the beginning of the night ſhe ſlept foundly, but being awakened ſhe fell into a very horrid convulſive fit, which preſently paſs'd into a quick deadly *Apoplexie*, for being made inſenſible, and ſpeechleſs, ſhe left this life within twelve hours.

The rational account of the diſeaſe taken from anatomical Obſervations.

When various judgments had paſſed, about the cauſe of the ſickneſs, of which this illuſtrious Lady dyed, moſt flinging all the evills on the diſtemper of the womb, others on an Ulcer or Impoſthum, which they ſuſpected lay hid, ſomewhere about the *viſcera* of the *abdomen*; it pleaſed her friends, that her dead Carcaſe, kept long opened for the Funeral, ſhould be dilligently inſpected, and ſo the genuine Cauſes of the diſeaſe, and her death, might be inveſtigated; which task being left to my care, I executed with all the dilligence I was able.

Therefore in the firſt place, it was worth obſervation, about the habit of the body, that the members and lower parts, nigh and beyond the ſeats of the pains, were very much waſted; as her thighs, quite worn away, appeared like a Skelliton: In the mean time, her face, neck, and arms, remained full, and plump enough: from whence it appears, that the nervous Liquor, does help no leſs to the buſineſs of nouriſhment, than to the exerciſe of the animal faculty: wherefore, when that Liquor, being much hindred in its paſſage, the loyns and belly, taken up with the continual Convulſions, did not deſcend, with a due influx, to the inferior parts, they for that reaſon, became preſently both without ſtrength, and lean, and waſted. This kinde of Atrophie, differs in this, from other hectical waſting, which happens from the vice of the blood, becauſe in this latter, an hippocratick or waniſh face, is the chief ſigne of the Diſeaſe, in that firſt mention'd, the countenance, and aſpect, ſhow little or nothing of evill.

The dead body of this noble Lady, tho very lean, and that her bowells were

all

all the emptied, yet quickly putrified, for within 40. hours all the skin was diſcolour'd, and appeared in this part livid, in that green, and in others blackiſh; and her Corps ſo ſuddenly putryfying, yielded a moſt horrid ſmell, the reaſon of which without doubt was, that by reaſon the muſcles were exerciſed with perpetuall Convulſions, the principles of their mixture, were ſo much looſned, that they being in a readineſs for diſſolution, quickly after death, fell aſunder one from another, after the like manner, as we may obſerve of the fleſh of wilde beaſts, which being tyred with a long courſe, or beaten to death with Clubs, for this much ſooner putrifies, then the fleſh of thoſe, which are kill'd quickly, and peaceably.

Her belly being opened, the Inteſtines, and ventricle appeared whole enough, *viz.* Intire and well colour'd, but they were emptie, and as it were blown up, for as much as they were troubled, almoſt with perpetual evacuations, *viz.* Thoſe placed above or below: in all this Cavity, no foot ſteps of an Ulcer, or Impoſthum were perceived. Whilſt we were ſearching the cauſe of the diſeaſe, and rolling the Inwards here and there, there was ſomething met within the meſentery, worthy notice, to wit, about its middle, where it is fixed to the back, and contained the greater folds of the nerves, a ſubſtance ſomewhat looſe, and inflated, as it were with many little bladders, equalling an hands breadth, was ſeen, after that manner, as when in a ſhoulder of Veal, the inter-ſpace of the muſcles, are blown up, by the Butchers, that thoſe parts might ſwell up, and ſeem fuller, and fatter: In this place of the meſentery, becauſe it was more tumid and ſofter, we thought ſome humour, the cauſe of the pain, to lodg there, but opening it, I found only the membranes to have been looſned one from another, and to conclude nothing but winde, within its inter-ſpaces: which ſeperation of the membranes, and devulſion one from another was without doubt induced, by the frequent Convulſions or exploſions of the ſpirits, which within the enfoldings, and nervous *fibres*, there thickly planted, were almoſt continually provoked; and thoſe Convulſions hapned, by reaſon of the heterogeneous, and exploſive particles being derived thither, from the head, by the pipe of the Nerves.

But as to thoſe torments of the belly, and as it were an aſcent of a bulk or ſubſtance in the convulſive diſtempers, and the inflation of the *Abdomen*, it is not to be doubted, but that the ſeat of the morbific cauſe, did lye hid in that part of the meſentery: but becauſe ſo much ſuſpition was had of the womb, being chiefly affected, we did next inquire how much this Inward deſerv'd it: Therefore having dilligently ſearched the tunnell, placed within the *Os pubis*, I found the womb in its due place, and as to all parts ſound, and well furniſhed: its body was drawn to its juſt proportion, altho it was but 5. weeks ſince ſhe had miſcarried, *viz.* It was like a ſmall pear in figure and magnitude; the *Glandulas* on either ſide of the bottom of it, which are called the teſticles, appeared very ſmall and flaggy, without any ſuperfluous or virulent humour contained in them: the body of the womb, whereever it was diſſected, equal'd a thumbs breadth in thickneſs, its inward Cavity was no bigger than what would hold a bean: within this hollowneſs, as uſe to be in the Caverns of other Inwards, was included a mucous or dreggy matter, in a very ſmall quantity: but in truth, about the womb, or its *appendix*, there was nothing, to which might be imputed as a morbific cauſe, of the ſymptoms but now deſcribed: from whence therefore it may be demonſtratively concluded, as I at firſt thonght, that the paſſions termed from the womb hyſterical, are moſt often excited, from ſome other cauſe, than the fault of the womb.

The Inteſtines being removed, we found alſo the reins ſound enough, but one of them was of an unuſual figure, *viz.* It was cleft into many lobes, like the Kidney of a Calf.

The *Milt*, *Pancreas*, and *Caul* without fault: the *ventricle* was much blown up, and its inward Coat was plain without folds, or wrincles, which certainly hapned, by reaſon of its frequent Vomiting, this Inward being almoſt continually troubled with Convulſions: Beſides, for this reaſon, the tone of the ſtomach being broken, it did neither rightly deſire, or concoct the food, or aliment.

The *Liver* very much differ'd from a ſound conſtitution, for it was tumid, and ſomewhat hard, of a pail colour, like rotten wood, wholly dry and without blood,

blood, and this without doubt, the frequent uſe of Cordiall, and highly hot liquors had effected.

The *Lungs* were of a blewiſh colour, and every where obſtructed, and ſtuff'd with a ſtinking and frothy matter: Certainly this Inward and the Liver had been vitiated of a long time, wherefore as the blood being degenerate, and very much depraved of a long time, from its right temper, had yielded the firſt ſeeds of this ſickneſs, ſo alſo it afforded a conſtant cheriſhment of it.

But indeed, we ſought, and that not in vain, for the chief and as it were originall cauſe of the diſeaſe, in the head; therefore the skull being taken off, the veſſells of the *Meningæ*, and thoſe creeping about the brain, appeared full, and diſtended with blood, when in the reſt of the body, ſcarce any blood had flowed forth, in the cutting of it: the thicker *meninge* being removed, thorow the other thin and pellucid one, was diſcerned a clear water, filling the enfoldings and crevices of the brain, and as it were overflowing its whole ſubſtance: In truth the ſerous heap of waters, had filled full all the Cavities, and inward places of the brain: the enfoldings of the *choroides*, or net-like membranes of the brain, being a long while immerſed in water, and as it were boyled, were become diſcolour'd and half rotten: nigh to the beginning of the Splanchnick nerves, or belonging to the Spleen, the water inſinuating it ſelf very much, had ſeparated the *pia mater* from the trunk of the oblong marrow or pith, for two fingers breadth: without doubt, the morbific matter deſcending from the head, by the paſſage of theſe nerves, into the enfolding of the meſentery, was the cauſe of the pains and Convulſions: Further, the ſame matter alſo, afflicting the heads of other nerves, and paſſing thorow their pipes, produced afterwards, theſe moſt cruel diſtempers in other parts, to wit, almoſt every where, of the whole body.

The Method of Curing the hyſterical diſtempers.

As to the Cure, or means of healing, uſed in the paſſions commonly called Hyſterical: foraſmuch as the ſymptoms of this diſeaſe are very much convulſive, therefore it is fit, that anti-ſpaſmodic or anti-convulſive Remedies, ſuch as were before deſcribed, ſhould be chiefly indicated; but when theſe diſtempers moſt often happen to the female ſex, in whom for the moſt part, the menſtrual flux, and other accidents of the womb do challenge a part in the morbific cauſe; therefore medicines reſpecting the various diſpoſitions of the womb, are to be added to the former, and many ways to be compounded with them. The Therapeutic or Curatory Indications, are either Curatory, to be adminiſter'd in the fit; or preſervatory which are inſtituted out of the fit, that take away the cauſe of the diſeaſe, and prevent its comings or acceſſions.

Curatory.

1. As to the firſt, if the fit is wont to be light, and without other perturbation of the ſpirits, it may be permitted to paſs away of it ſelf; but if it being more heavily troubleſome, there will be need to bring ſome help to nature much oppreſſed, this only thing is to be done, that the ſpirits being freed from the Embraces of an heterogeneous *Copula*, they may remit their inordinations and exploſions: for this purpoſe, it is grown into uſe, to put to the noſe ſtinking, and ill ſmelling things, the ſcents of which compell, and repreſs the too fierce ſpirits, ready to leap forth, into their orders, and alſo ſhake off from them, the heterogeneous *Copula*, and often drive it quite away: *Aſafætida*, *Caſtor*, *Galbanum*, being put into fine Linnen and applyed to the noſtrills are convenient; alſo burning of *Partridg feathers*, *old skins*, and *ſulphur*. Beſides the ſpirits and *oyl of ſut*, or of *Harts-horn* do not ſeldome help: yet I have known theſe kinde of fumigations, being very troubleſome to ſome women, to increaſe the fit; it is probable that the ſame ſometimes may too much irritate the ſpirits, and drive them into greater diſorders; and as ſtinking things put to the noſe, ſo the like poured into the mouth, do often bring help: wherefore we give often with good ſucceſs, to hyſterical people, *Tinctures of Caſtor*, *Solutions of Aſſafætida*, and *Galbanum*, *ſpirits of Harts-horn*, and *Sut*, with proper waters. Take of the *ſpirits of Harts-horn*, from 12. to 15. and 20. drops, let them be taken in a little draught of the following Julap. Take of the *waters* of *penny Royall*, and *mugwort*, each ℥ iii. of the *water* of *Briony* compound ℥ ii. of *Caſtor* tyed in a knot and hung in the glaſs ℥ ß. of the whiteſt ſugar ℥ i. mix them. Take of the *Tincture* of *Caſtor* ℈ i. to ℥ ß. let it be taken ia a little draught of ſmall beer. Take of *Aſſafætida*, and *Galbanum* ℥ ii. let it be diſſolved in *ſpirit of wine* to the extraction of a red-tincture.

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The doſe ℈ i. in two or three ſpoonfulls of *featherfew water*. *Riverius* very much crys up that of *Solenander*. Take of musk, and of *dragons-blood*, each ℈ i. take more or leſs of it in water of *Lillies of the Valley*, ℥ iii. or iiii. *John Anglicus* commends *parſnip-ſeeds*, or the *ſeeds* of *Penny-royal* in wine, or other proper Liquor, as a moſt certain Remedy. If the fit perſiſting a long time, ſhould cauſe want of ſpeech, or motion, the more ſharp Clyſters, as of *bryony-Roots*, and *Carminatives* boyled in water, are to be adminiſtred, and fricions of the thighs, and feet are to be order'd; and if they ſhall yet grow ſtronger, Cupping-glaſſes are to be applied to the belly and groin, yea alſo, let them be often provoked to ſneezing: it is convenient to give ſome, in the middle of the fit, a draught of ſimple cold water, or in which *Champhir* had been diſſolved.

Preſervatory. 2. The preſervatory Indication comprehends theſe three Intentions, *viz.* In the firſt place to take away, or to derive to ſome other place the impurities of the blood, apt to be poured forth on the brain, and nervous ſtock. Secondly, to fortifie the brain, and ſo to ſtrengthen the indwelling ſpirits, that they may either not at all receive, or may eaſily ſhake off the heterogeneous *Copula*. Thirdly, to amend whatſoever is enormous in the womb, and contributes to the convulſive diſpoſition.

1. The firſt Intention is performed by purging, and phlebotomy, and other common ways of purifying, and purging the blood and humours. If there be opportunity for an emetic, I judge it beſt allways to begin with it, eſpecially in Cacochymicks, or bodies full of evill humors, in the longing diſeaſe, and Pica, and in ſuch whoſe great load of viſcous phlegm, ſtuffed within the folds and coats of the ventricle, hinders the virtues of other medicines: The next day after the Vomit, unleſs any thing bids the contrary, let blood be taken, in women of a hotter temper, preſently from the Arm, and afterwards if need be, from the foot, or from the ſedal veins with Leeches; but in bodies troubled with obſtructions, and leſs hot, let blood be taken more ſparingly, and more rarely, and only in places ſcituate below the womb: After theſe Evacuations (if they are to be ordered) rightly performed, once within ſix or ſeven days, a purge is to be preſcribed according to the following forms. Take of *pill-fetida major*, ℥ iß. of the *reſine of Julap* xii. grains of *Tartar Vitriolat*, and *Caſtor*, each ℈ i. of *ammoniac* diſſolved in hyſterical water, what will ſuffice to make xii. pills, for iii. doſes. Or take of the *reſine of Jalap* gr. xviii. of *Calomelaus* ℥ i. of *Caſtor* ℈ i. make a powder, let it be divided into iii. parts for iii. doſes, let it be given in the pap of a *roaſted apple*, or in *Conſerves* of *Borage*: ſo thoſe induced with a more hot temperament, a doſe of extract, or our ſolutive ſyrrop may conveniently be adminiſtred: for the revulſion of the morbific matter from the head, Iſſues made in the calf of the leg, or thigh, and ſometimes veſicatories, legatures, and painfull rubbings, are wont to be adminiſtred: But not only a purging of the blood, and a revulſion of its recrements from the head, but an alteration of its Liquor, and reduction of it to its due temperament have here a place: Wherefore in ſome hyſterical people, ſteel Medicines help, in others the uſe of Spaw-waters, or whay, in others the baths are wont to be ſignally profitable.

The ſecond Intention, to wit, the rectification of the brain, and animal ſpirits, is performed with Cephalic, and properly anti-convulſive medicines: which indeed ate to be diligently exhibited, almoſt every day, when they do not purge or bleed: ſince there are various *ſpecies* of ſuch like Remedies, and ſeveral manners of adminiſtrations, we will here add ſome of the more choice forms.

Take of the Lees of *bryony*, *Aſſa fetida*, *Cvſtor*, each ℥ i. of the *Salt of Coral*, *Amber*, *Tin*, each ℥ ß. of *Galbanum* diſſolved in hyſterical water, what will ſuffice to make a Maſs: doſe, half a ſcruple, to ℈ i. morning and evening, drinking after it a doſe of proper liquors.

Or, Take of the *ſeeds* of *Wilde-parſnips*, of *nettles* each ℥ ii. of *vitriol of Steel* ℥ i. of the extract of *Gentium*, *featherfew*, each ℥ i ß. with what will ſuffice of the *ſyrrop of Mugwort*, make a maſs, let half a dram be taken after the ſame manner.

If the form of a powder pleaſes better; Take of the *Roots of Virginian ſnake-weed*, and *Contrayerva*, each ℥ i ß. of *Coral* prepared, of *Pearls*; of *white-Amber*, each ℥ i. mingle them, make a powder: Doſe ℈ i. to half a dram, morniug and evening, with an appropriat Liquor.

Opiats are Compoſed after this manner. Take of the *Conſerves* of the *flowers*

of

of the Lilly Convallis, of the *male-pæony*, of *betony*, each ℥ ii. of the *seeds* of *Pæony*, of *red Coral* prepared, each ʒ ii. of the powder of *Cretic Dittany* ʒ i ß. of the *salt of wormwood* ʒ ii. with what will suffice of the *syrrop of the rinds of Citrons*, make an Electuary. The dose morning and evening the quantity of a nutmeg. After the same manner may be given to poor people *Conserves* of the *Tree of Life*, or of the *leaves of Rue* twice in a day.

The Liquors appropriat against the hysterical affections, and to be drunk after the aforesaid Medicines, are, either distilled waters, which are to be taken by themselves, or with other things, in form of a Julap, or decoctions, or tinctures and Infusions.

Take of the *water of Mugwort*, and of *penny Royal*, each half a pint, of *hysterical water* ℥iiii. of the *Tincture of Castor* ℥ß, of the *Syrrop of Coralls*, ℥i ß, mix them. The dose from ℥i to ℥i ß, with any of the medicines afore described.

Take of the *leaves of Penneroyall*, of *Fetherfew*, of either *Southernwood*, of *Calaminth*, of *Nep*, and of either *Horehound*, each i handfull; of the *Roots of Bryonie* ℥iiii, of the *seeds of Parsnips* ℥ii, cut and brused, put them into white-wine or Cider, six pints, and so distill them, according to art.

Take of the *Root* of the *male Peony*, *Angelica*, *Valerian*, each ℥ ß, of the *leaves of mugwort*, *ground Pine*, *Calaminth*, *Peneroyal*, and *Misseltow of the Oak*, each i handfull, of the Seeds of either *wilde Parsneps*, each ʒiii, of *Raisins* i. handfull; let them be boyled in 4 pints of *Spring-water*, to the half: add to it of *white-wine*, *lib* i ß, strain it, and keep it in close vessells; The dose ℥iii, or 4 twice in a day.

Take of the *wild-Parsnep Seeds* brused ℥ ii, of *Castor* ℥ i, let them be put into a Glass, with i quart of *white wine*. The dose ℥ ii twice in a day.

3. As to the third Intention, which inhibiting the disorders of the womb, doth promote the cure of the passion called hysterical; I say, first of all what in times past was believed, concerning the Cause and scope of curing the disease, that the womb did ascend, therefore that it ought to be reduced into its right place; is altogether fictitious, as we have elsewhere shown: The falling down of the womb, or its coming forth, oftentimes happens; but rarely, or never produces the hysterical Distempers: Besides, the dislocation of the womb in childbearing Women, sometimes happens, presently after their bringing forth, to wit, when the body of the womb being made Capacious, and newly emptied, doth not sink down or fall within the Tunnel, in its right place, but upwards inclines now to the right side, now to the left, and there being drawn together like a purse, is folded into a great bulk, which kinde of bulk, remaining long, nigh the side of the groin, is wont to give a suspition of another child, or the secondine or afterbirth to be left behinde, or also of some hard swelling tumor there increasing; but afterwards, when the *menstruum* coming plentifully away, the womb is reduced to its due magnitnde, that tumor by degrees vanishes: bnt while it there remaineth unless for that reason, the *Lochia* or *menstrua* were stopp'd, it doth not produce the hysterical passions. For the reducing of this part the sooner into its due position, fomentations, Liniments, and Plaisters, are convenient. But most times that Symptom, passes over, of it self, without any further harm. To what other distempers the womb is obnoxious, in child-bearing, and by what method to be helped, we have fully shown in another place. As to the other vices of that part, which happen to some women, not bearing children, we declare, that they chiefly are either a disease of the womb, made by the breaking of the unity, *viz*, which is either some ulcer, or Tumor; or an inhibition of some wonted excretion, or putting forth, to wit, a suppression either of the menstruous blood, or the whites, or the seminal humour: Moreover because of the *menstrua* being retained, the heterogeneous particles being often poured forth into the head, bring in the Convulsive passions: in like manner, when the whites are stopped, the excrementitious matter, being supped up by the blood, is deliver'd to the brain and nervous stock: yea, when an usual evacuation of the seed is hindred, the superfluities of the nervous humour, flow back upon the brain, and infect its indwelling Spirits, with an explosive and morbific tincture: There is no need here, to discourse more largely or particularly, of those Peculiar distempers of the womb, but to compound medicines, and intricate administrations, proper for womens diseases, with anticonvulsive Remedies.

CHAPTER. XI.

Of the Distempers commonly called Hypochondriack, *which is shown to be, for the most part Convulsive: briefly also of* Chalybeats *or* Steel-Medicines.

IN the foregoing Chapters, we have clearly shown, that the Passions called hysterical, do not allways proceed from the womb, yea, more often from the head being distemper'd; next we shall inquire concerning the hypochondriacal Distempers, of what original and nature they are, and upon the fault of what parts they chiefly depend. The vulgar opinion is, that the symptoms wont to accompany this disease, are wholly produced from the spleen; wherefore, they are ascribed very much to vapours, arising from this inward, and variously running up and down, here and there; when in truth, these sicknesses for the most part are convulsions, and contractions, of the nervous parts: but that it might appear, by what causes they are wont to be excited, we ought to consider first, the Symptoms themselves, and to place them into some order or rank.

A description of the hypochondriacal Affections.

As to the Distempers therefore, which are vulgarly termed *hypochondriac*, it is observable, that they happen chiefly to men of a melancholly temperament, with a dark aspect, and more lean habit of body: it is rarely, that this disease troubles fair people, with a fresh Countenance, or also those indued with a too Phlegmatic complection: It betrays it self in manifest signes, about the hight or midest of their Age; men are found to be more frequently obnoxious to this, than women, being made habitual in either, it is very hardly, or not at all to be cured, in women, by reason of their weaker Constitution, it is accompanied, with a great many more Convulsive Distempers, wherefore, Commonly it is said in this Sex, the hysterical, to be joyned with the *hypochoudriacal* Passion.

The Symptoms which are imputed to this Disease, are commonly very manifold, and are of a divers nature, neither do they observe in all, the like beginning, or the same mutual dependency, among themselves: for they seem in these, most to affect the Inwards of the lower belly, in those the *Præcordia*, in others the Confines of the Brain: and in most, though not in all, the ventricle labours much; concerning the appetite it is often too much, but presently burthened with what it hath taken in; and when the food, staying longer in it, by reason of slowness of Concoction, their Saline particles being carried forth into a flux, pervert the whole mass of the Chyle, into a pulse or pottage, now Sour, or austere, now salt or sharp: from hence pains of the heart, great breakings forth of blasts, rumbling of winde, and often vomiting succeed; and because of a pneumatick defect, or of Spirits, the Chyme or juice, is not wholly made volatile, and carried forth of doors, but that the ballast of the Viscous or Slimy matter, sticking to the coats of the ventricle, is left behinde; an almost continual Spitting infests them; a distention in the *hypochondrium*, and often there, and under the ventricle, a cruell pulsation is felt: also there pains ordinarily arise, which rnn about here and there, and for many hours miserably torment with a certain lancing: In the mean time, from the Contractures of the Membranes, and from the fluctuation of winds, stirred up by that means, rumbling and murmurs are produced: Also in the *Thorax*, oftentimes there is a great constriction and straitness, that the respiration becomes difficult and troublesome, upon any motion: also, most grievous asthmatical fits fall upon some: moreover, the sick are wont to complain of a trembling, and palpitation of the heart, with a noted oppression of the same: also a sinking down or melting away of the Spirits, and frequent fear of a trance, comes upon them, that the sick think Death is always seising them: In this Region, about the membranes, and chiefly the *mediastinum*, or that divides the middle of the belly, an accute pain, which is now Circumscrib'd to one part, now extended to the shoulders, is a familiar Symptom of this Disease. But indeed in the head, an Iliad of evills doth for the most part disturb hypochondriacal people, to wit, most cruell pains returning at set times, do arise, also

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the swimming of the head, and frequent *Vertigoes*, long watchings, a Sea, and most troublesome fluctuation of thoughts, an uncertainty of minde, a disturbed fancy, a fear and suspition of every thing, an imaginary possession of diseases, from which they are free; also very many other distractions of Spirits, yea sometimes Melancholly, and madness accompany this sickness: besides these interior Regions of the Body beseiged by this Disease, wandring pains, also Convulsions, and numbness, with a sense of pricking, invade almost all the outward parts; nightly Sweats, flushings of the Blood in the face, and the palms of the hands, eratick feavours, and many other Symptoms, of an uncertain original, do every where arise; concerning which, forasmuch as the genuine Causes, and the manner of their coming to pass, could not be readily determined, presently all the fault is cast upon the Spleen, and Physitians accuse that, as if it were the chief author of every irregular Distemper; but by what right or authority, by and by shall be sought into: In the mean time, it is to be observed, that the chief Symptoms of this sickness, are Convulsive, and depend immediately upon the irregularities of the animal Spirits, and the nervous juice, rather than on the evill disposition of the *Viscera*, serving for Concoction. But indeed, from whence the first rise of this most complicated Disease proceeds, and by what means it brings forth the divers manners of distempers, in so many places, will not be so easie to determine.

The hypochondriacal distempers belong to the nervous kinde.

It would be a tedious thing, to shew here, what the ancient and modern Physitians thought of the *hypochondriack* Passion, and of its essence, and Causes; we will only take notice, that most of them do ascribe this sickly Disposition, to the only fault of the Spleen; In the mean time some contend that the whole confines of this Inward, partaking of part of the fault, the blood flowing every where in the Splenetick, and Epigastric Vessells (or those belonging to the Spleen and belly) for that it being guilty of an hot and dry intemperature, and so obnoxious to too much fermentation, brings forth the original, or gives a beginning to this manifold evill: But the famous *Highmore*, affording relief, as well to the Spleen, as the Womb, hath cast the chief Cause of this Disease, wholly on the vitious Constitution of the ventricle; and from thence, he would have the reasons of the aforesaid Symptoms, to be originally sought, But indeed, that he might frame a fit *hypothesis*, for the solving the *Phænomena* of this sickness, he first supposes, the tone of the stomach to become too loose, and weak, that for that reason, it hardly, and very imperfectly Concocts the aliments: so that the thin, and more Spirituous part of the Chyle, being sent from thence, sooner than it ought, to the blood, perverts its disposition, to a hot and sour temper; then the residue of the food, by a longer stay, within the Ventricle, degenerates into a ponderous, and viscous or clammy Phlegme; which also, by its Stagnation (even as it is observable in things to be eaten, being longer kept) becomes very sour, or sharp: But from hence, that learned Man argues, that from the blood made too serous and thin, its effervescencies quickly passing thorow it, are induced: and from the stomach, loaded with ballast of ropy or viscous matter, the winde and distentions of the Ventricle, and *hypochondria*, as also the belching, and troublesome Spitting, do arise: whereby indeed, he wholly exempts the Spleen, from this fault, he contends, that it doth neither draw to it self the melancholly dregs of the blood, nor serves for any office whatsoever, about the Sanguification or the making of blood; but that its use almost only consists in this, that this Inward swelling up, or growing turgid with very hot blood, it administers heat to the adjacent Ventricle, and cherishes it with gentle warmth.

The causes of the hypochondriac passion is inquired into.

Altho I may so far assent to this famous Author, concerning this opinion, that I yield, the ventricle doth often grievously labour in this Distemper, forasmuch as the tone of which, being made lax, and its strength broken, by reason of the indigestion of the aliment, a load of viscous Phlegm, or Petuitous matter, is begotten even in its bosom, to which, by reason of the Saline particles, being brought into a flux, by their long stay, oftentimes a notable soarness, and austereness happen; then because the fault in the first Concoction is not mended, the dyscrasies and disorders of the blood, receive that want of digestion in the second: But yet he cannot draw me into that opinion, that the ventricle is always chiefly in the fault, or that the other Symptoms, of the hypochondriacal

The Hypothesis of Dr. Highmore sifted.

pochondriacal Disease, depend only on its vitious Constitution: For I have known many, cruelly afflicted with this sickness, who have been well enough in their stomach: although they have very much complained of the pulsation in the left hypochondrium, of the straitness of the breast, and a wandring pain excited in it, also of the trembling, and oppression of the heart, with a continual fear, and disturbed Imagination; in the mean time, they were wont to desire food greatly, and to digest whatsoever was eaten, without any trouble of the ventricle, or heaviness, and also without any spitting or acid belching: yea, I have observed others, great drinkers, and using an evill manner of living, to have contracted a loosness of the stomach, with an ill digestion, windiness, and frequent vomiting, who found enough about their *præcordia*, and animal faculties, were not at all accounted for *hypochondriacs*: Besides, in this Distemper, the ventricle is often rather sick from the vitiousness of other parts, or of the Blood, than from its own default; because, it is usual for those sort of sick people, to be well in their stomach, so long as they may lye abed, and breath it forth; but when they are raised up, the pores being shut up, and the dregginess of the bloudy mass stagnating within, presently to be afflicted with the pain of the heart, an aggestion of winde, and frequent endeavours to vomit.

For these, and other Considerable Reasons, I judge the original of the *hypochondriacal* Disease, to be derived from some other fountain, than the weakness of the Ventricle: but forasmuch, as among the parts here primarily suspected, to be affected, great complaints are made against the Spleen; it will be worth our while, to enquire, what office this Inward doth discharge, then, as often as it fails in it, whether it contributes to this Disease.

The use of the Spleen is inquired into.

Tho I may grant with Doctor *Highmore*, that the Spleen doth cherish the Ventricle with its warmth, and so perhaps in some measure help Concoction: yet I do not conclude, this part to be framed chiefly for that end, but for some more noble uses; because, there seems to be need, for the digesting of the food in the stomach, not so much of heat, as of an active ferment: For fishes being actually cold, devour their food whole, and without the help of heat, easily concoct the same, being resolved as it were by a certain *menstrum*: besides, it is observed of the spleen, that though in man, its whole substance lyes near to the ventricle, in most other creatures, who are indued with a longish form, as to the greatest part of it, it is removed far from the Ventricle: Further, if the Spleen be the only Chimny, in which the blood warming the Ventricle is contained, what is the reason, that it, rather than the Liver or Lungs, becomes of a livid or blewish colour, and is stuffed with a black blood, and that less hot?

See his discourse of fermentation. Chap. 5th.

When I consider these things, which sometime since I have observed; concerning the use of the Spleen; it seems far more probable, that a certain dreggy portion, *viz.* a matter, consisting of an earthly, and fixed salt, is layd up in this Inward, by the blood carried to it, by the arteries, which being exalted there as it were by digestion, and into the nature of a ferment, is lastly committed to the blood, flowing from it by the veins, which inspires or quickens it, with a certain leven or fermentation, and performs the same thing about its Spirit, or making it Spirituous, as our ferment commonly called Leven, doth, being put into a batch of bread or dough; for as a certain portion of the unbak'd bread or dough, being kept to a sourness, preserves the same nature, that it doth ferment or leaven other bread or dough, and stirs up in it the otherwise sluggish particles into motion; so it seems, that the blood being laid up in the milt or Spleen, and there getting a sourness, as it were by stagnation, puts on the nature of a ferment, whereby indeed the rest of the mass of blood, and perhaps the other humours, are actuated, and as it were Spiritualised, into a more lively motion. What hath been ingeniously wrote, by a late author, *viz.* the most learned *Velthusius*, concerning the use of the Spleen, may have relation to this: for he hath determined as highly probable, a ferment to be contained in this Inward, whereby the sluggish particles of the blood, are brought into a state of activity: Because, taking notice, that in children, and others indued with a sanguine temperament, and more fat or dull habit of body, even as their manners, and disposition of minde were inclined to idleness, softness, and dulness, so their Spleen was ever of a reddish colour, and full of florid blood, like the Liver: from hence he concludes, that the spleen doth but little perform its office

fice in these, as the gential parts before ripe age, or in those of weak loyns; but on the contrary, forasmuch as men of a middle age, and chiefly in those, who are of a severe Countenance, and of a lean body, as in them appear marks of cunning, Sagacity, fortitude, and constancy, so their spleen is found to be of a livid or blewish colour, and imbued with blood, as it were muddy: further he argues from hence, that the blood, being kept long in the spleen, as in a Conduit or receptacle, turns plainly into ferment, by which its remaining mass, being from thence inspired, is made more subtil, and begets more acute Spirits, both in the vital, and in the Animal Kingdom or Government: For he supposes, our bodies naturally to abound, with too much humidity, by which indeed the function of the parts, and many of the *viscera*, are very much dull'd: but that the spleen, doth communicate to the mass of blood, solid, firm, and constant parts, and not easily to be dissipated; and that those do wipe away that moistness, and with it carry away in some measure, that softness, from the blood and Spirits, which is predominate in tender age: almost after the same manner, as the north-winde, or the eastern gales, fanning and intimately penetrating the air, with the dryness and strength of their parts, breathe health or strength to the air, and to our Bodies.

But since I have in another place, declared what I have formerly thought, concerning the Spleen, there will be no need to repeat it in this: yet I shall further note, that in bodies of living creatures, compacted out of a quinarie of elements, as the spirits ought to be more strong then the rest: so indeed they being intangled with a viscous humidity of Sulphur, and water, are so hindred, that oftentimes they are not able to exercise their strength or powers lively enough; hence saline particles, for that they are very much fermenting, are required for this, that the spirituous little bodies, almost overwhelmed by the embrace of the others, and stupifyed, might lie awakened, and set at liberty, and into motion. Wherefore we experience in our selves, when the spirits are dull'd, by the blood being too much exhal'd, that notable help is brought, by sharp liquors, as chiefly small wines, and Cider: for these kinde of Remedies sharpen the spirits, and shake off all heavinesse. Such a kinde of fermenting virtue, we easily believe to be continually exercised, by the Spleen being in right order, towards the blood and nervous Liquor.

For as this Inward is formed with a threefold sort of vessells, *viz.* with arteries, and veins, and besides with great enfoldings of the nerves, and a most thick Contexture of nervous *fibres*; we think the use of each of them, to be set apart for this end: to wit, by the Arteries, the blood is carried to the Spleen, hence it lays up its dreggs, composed of a fixed Salt, and an earthly matter, in its passages and porosities, and these there layd up, as it were by a certain digestion, are brought into a juice very fermentive: A portion also of which, being carried back to the blood, by the veins, is continually mixed with it: and so its whole mass, is inspired with those kinde of fermentive particles, from the Spleen; by which, a certain austerity and sharpness, with vigour of motion, is given unto it; so that, for that reason, the blood it self is carried more lively in the vessells; also from thence, the nervous juice, procreated from the blood, being more active supplies the animal regiment: But truly, the Spleen doth not only by this means mediatly, and by the intervention of the blood, inspire the brain and nervous stock, with a fermentive virtue; but it may be lawfully believed, that this is done somewhat more immediately, by the passage of the nerves, dispersed in the spleen: for, because in this part, anatomie discovers a great company of Nerves, and nervous enfoldings, and of *fibres* springing from them, it may well be doubted, for what use they should serve: Concerning this, it is first to be observ'd, that the ventricle, and the Spleen, have a most intimate Commerce with the brain; insomuch, that *Helmont* did place the seat of the Soul, in those Inwards, but this is possible to be done, by no more commodious way, than by the aforesaid nerves: Wherefore, we may here diserv edly suspect, that not only the animal Spirits, are the messengers between the one part, and the other, but also, that the nervous Liquour, which is both the food, and the ventricle of these spirits, doth descend now from the brain towards these Inwards, and now being received from these *Viscera's* by the nerves, doth creep thorow towards the head: which kinde of spleeny Juice, being dila-

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ted to the brain, sharpens the animal Spirits, and raises them up being slothfull, and irritates them into quick motions: from whence it is commonly said, the sharpness and sagacity of the minde, doth proceed from the Spleen, and Splenetick people, are accounted Ingenious: But it is probable, that the rage, and force of the passions, being begun by the Spirits inhabiting the brain, are carried to the spleen, by the passage of the nerves; and so the spirits there dwelling, are pathetically troubled, and the blood flowing thither, is moved into a multitude of perturbations: for from hence it in some measure falls out, that in anger, sadness, and other distempers of the minde, according as the ferment if the Spleen, being more or less moved, is inspired to the blood, its liquor diversly boyls up: Further, for this reason it happens, that great inflations and Commotions, of the left *hypocondrium*, come upon splenitic people, from every violent passion.

The reasons of the hypochondriacal Symptoms laid open.

These things being thus premised, concerning the use of the spleen, it will be easie, according to our *hypothesis*, to lay open very many of the symptoms, belonging to the *hypochondriac* Distemper; and to give reasons for each of them: For when the Spleen is wanting in its office, that is, when it doth not strain forth the melancholly recrements of the blood, nor cook them into a fermentative matter, as we but now observed in children, and others of a sanguine Complexion, or too phlegmatick, to happen often; the disposition of the minde, is made duller, the body grows fat with idleness, yea, and the blood being more sluggish than it ought to be, is apt to stand still within its vessells, or at least to be less lively circulated: But on the Contrary where the fermenting power of the spleen, is too much axalted or perverted, the blood by that means being more sharp than usual, or made more sour, it runs about rapidly here and there, and conceives irregular motions; yea, and the nervous juice, falling away from its right temper, imbues the animal Spirits, with an heterogenious and an explosive *Copula*, and so irritates them, as it were with goads, into frequent Convulsions: as that not wholly undeservedly, many kindes of diseases, may be imputed to the Spleen being out of order: But the ways or means of affecting, whereby the Spleen being evilly disposed, doth produce the symptoms of the hypochondriack passion, or at least contributes to the rise of them, are chiefly these following.

The Influences of the Spleen in producing the symptoms unfolded.

First, it sometimes happens, that the spongie substance of the spleen, from the fæces of the blood, being too much impacted, in its pores, and stagnating, is very much stuffed, and obstructed: that from thence, it doth not sufficently receive, the recrements of the bloody mass: but the same being carried thither, but not received do flow back into the neighbouring branches of the Cæliack Artery, from whence they are presently carried, into the membranes of the ventricle, the Caule, the mesenterie, and other nigh parts, and are wont to be affixed to them; hence the tone of those *viscera*, are so much spoyled, that they do not rightly perform their due offices, about the concoction of the Chyle, and the membranes planted every way about, being much imbued with heterogeneous and irritative particles, for that they are almost continually pulled by convulsions here and there stirred up, they are grievously obnoxious to wandring pains, contractions, distentions, and the encrease of Windes; by reason of this kinde of regurgitation of the blood, from the Spleen, being obstructed, it is likely, that the pulsation, which is felt by hypochondriacks, under the Ventricle, is excited.

2. When the fæculencies of the blood, are excluded from the Spleens being obstructed, being fixed (as was said) to its neighbouring parts, they bring forth the sickly distemper of the left *hypochondrium*: but though indeed, that Inward sufficently receives the melancholly or atrabilious juice, carried to it from the blood, by the Arteries, yet oftentimes it does not rightly Cook it, but the Salt being too much excited, it changes it into a too sharp, or acid, austeer, or sour; or some other kinde of vitious humour: whereby, when as the whole mass of blood, and the nourishable Juice, contained in its bosome, are almost wholly infected, the fruits of the hypochondriack seeds, bud forth thorow the whole body; the blood grows unduely hot, is in some places impetuously moved, and again in others is apt to stagnate or stand still: from hence, it is familiar with Spleenetick people, presently afrer eating, to grow red in the face, to have the palms of their hands hot, their hypochondria to swell, oppressions of the heart, and noted variations of the pulse, to succeed, But these fermentative particles being translated, from the blood, every where into the solid parts, wandring pains, running

ing up and down here and there, and a ſenſe of pricking, are ſtirred up in many members of the Body: moreover, from this Infection of the blood, for that its maſs is changed, from a benign and balſamick temper, into a ſalt and tartareous, a lean habit of body, with a black and dark Countenance, is induced.

3. From the blood being ſo depraved, by the fault of the Spleen, oftentimes the taint is carried to the animal government; for heterogeneous and Convulſive Particles, are poured frequently into the brain, and from thence, into the nervous ſtock; ſo that the animal Spirits, dwelling in either province, conceive various irregularities: by reaſon of the evill being impreſſed on the head, hypochondriacks uſe to be troubled with various phantaſms, with an heap, and fluctuations of thoughts: beſides, to them happen frequent *Vertigoes*, Scotomies, headaches, and often parlytical Diſtempers: then, foraſmuch as the morbific matter, ſlides down from the head, into the nervous ſtock, Convulſive Diſeaſes are excited, in very many parts of the body, but chiefly about the *Præcordia*, and *Viſcera* of the lower belly: for when the Spirits flowing within the nerves, which reſpect thoſe parts, are greatly diſturb'd, by reaſon of the diſtemper of the minde, the Convulſive particles, the more readily enter into thoſe pipes, and more eaſily impreſs on thoſe Spirits, a Convulſive Diſpoſition: Therefore, partly by reaſon of the infection mediatly tranſmitted to the Brain, and partly by reaſon of the hurt, (as hath been ſhown) immediatly Communicated from the Spleen, the Palpitation of the heart, trembling, and frequent ſwooning, Conſtrictions of the Breaſt, impediments of breathing, Pains of the ſtomach, belching, Vomiting, and many other accidents in thoſe Inwards, happen to hypochondriacks.

4. Beſides theſe inordinations, which are wont to be derived by the paſſage of the blood, from the Spleen; into the humours and ſollid parts, and to the brain it ſelf, and nervous ſtock; there are other farther evills, which ſeem to ariſe from this Inward, alſo by the paſſage of the nerves: Becauſe, as we have ſhown, their extreme branches, and the nervous *fibres* themſelves, interwoven in the *Viſcera*, do drink in with their outward moſt little mouths, a certain humor, and convey it ſometimes upwards, it is highly probable, that the nervous *fibres*, diſtributed to the Spleen, (of which as we but now hinted, there is a mighty Guard) do receive its moſt ſharp juice, which Creeping higher, thorow the nervous pipes, becomes a Cauſe of Convulſive motions: In truth, that there may be thoſe intimate Commerces, between the brain, and the Spleen, to wit, far ſooner, than what can be made, by the compaſſing about of the blood, it may be lawfull to believe, that the nerves of the wandring pair, and the intercoſtal, to be the neereſt means of the paſſage, whereby theſe parts Communicate one with the other, and mutually affect themſelves. For it ſeems, that when the black bile or melanchollic tumor in the Spleen, grows turgid or ſwells up of its own accord, or is moved by ſome evident cauſe, its particles enter the nervous *fibres*, thickly diſtributed to the ſame, which diſturb the animal Spirits flowing in them, into exploſions, or at leaſt into ſome diſorder: then th pirits being ſo diſtrubed, infect thoſe next to them, and they others, till by their continued ſeries, the paſſion begun within the Spleen, is propagated even to the brain, and there produces inordinate Phantaſms, ſuch as happen to hypochondriacks, alſo on the other ſide, when a grievous diſtemper of the minde, occaſionally excited, within the brain, doth diſturb the Spirits inhabiting it, the impreſſion being carried to the Phantaſie, by the ſeries of the Spirits, planted within the nerves of the wandring pair, and the Intercoſtals, and ſucceſſive affection, it is brought even to the Spleen; hence its ferment being put more into commotion, ſtirs up Convulſions, both in that Inward, and in the whole neighbourhood of fibres and membranes; and beſides, forces the blood into ebbings and flowings, and into various æſtuations or vehement motions; yea and reflects the perturbations of the Spirits, upon the brain. From this kinde of reciprocal affection of the brain and Spleen, it comes to paſs, that hypochondriacks are ſo unquiet, unſtable, and fluctuating, at every thing thats propoſed, as if, according to the Poet, Ten mindes ſtrove in them at once.

A certain noble Gentleman, of a melanchollic temper, and always accounted for a Splenetic man, very much complained of a pain, and inflation of his left hypochondrium, with a frequent rumbling noyſe, and ſour belching, alſo of a *1. Obſervation.*

trembling

trembling of the heart, of an assiduous vertigo, too much waking, and a disturbed phansie: About the 35th. year of his age, the disease growing worse, he began hardly to sleep, and yet more rarely to get it at night, and to be molested in the day time, with a world of fluctuating thoughts, to have in suspition all things and persons, and greatly to be afraid of every object: his *Præcordia* seemed to be very much bound, and straitened, and to sink down to the bottom, as if the heart it self were depressed even into the belly; which Symptom, troubling him, he became very sad, and dejected in minde: yet afterwards, those distempers of the minde remitting, he felt with it his heart to be a little lifted up and also his *Præcordia* to be loosened, and stretch'd forth; besides, he very often sustained pains and Contractions variously excited, about the muscles of the *Viscera*, and Members, and running up and down here and there.

As to the nature of the disease, it is plain, that it is this kinde of Distemper, which is commonly called hypochondriacall: but as to what respects the Causes of these to be admired Symptoms, we may suppose, the mass of blood being degenerate, and stuffed with melanchollic or atrabilarie fæculencies, to administer or continually to suggest its adust recrements to the head; from whence, the Liquor watering the brain and nerves, being made sharp, and improportionate to the Spirits, did stir up the containing Bodies, into painfull Corrugations, or wrinklings, and Contractures: Further, when this Infection is chiefly derived from the head, into the Nerves of the wandring pair, and the intercostall, the brain and the *Præcordia*, are very much punished, by the malady from thence raised up. But that the Blood is depraved by that means, it seems to be imputed to the vice of the Spleen, forasmuch as this Inward, being amiss, it did not rightly strain forth the atrabilarie dreggs from the blood, but rather did more pervert whatsoever recrements it received from it, and the same being exalted into an hurtfull ferment, sent it back to the blood, and so very much infected its mass, and imbued it with a plainly acetous, and vitriolick evill Disposition.

It is plain to be understood, that those symptoms troubling the Head, *viz.* too much waking, the *vertigo*, a disturbed phantasie, with many others, did proceed from the heterogeneous particles poured forth from the Blood, into the brain: As to that straitness of the Breast, and falling down of the heart, with great fear and sadness, it may be thought, that the nervous *fibres*, inserted to the heart, and chiefly to the *Pericordium*, being moved into Convulsions, and wrinklings, do binde hard those parts, and pull them downwards; wherefore, there is perceived in the whole breast, as it were a certain constriction, and the heart it self seems to be depressed: Further, forasmuch the *Præcordia* being so streitened and depressed, the blood within the bosom of the heart is stop'd, and compell'd, as it were to stagnate, both the vital and the sensitive Soul, is much hindred, from its wonted expansion and irradiation, and for that Cause, being lessened and shortened in its constitution, those Cruell distempers of fear and sadness arise, but when the Convulsions remitting, that constriction of the heart and its *appendix*, is released, the Soul also, as a flame more expansed or enlarged, endeavours by little and little to shake off the Chains of those Passions. For the Cure of these Distempers, he had for a long time tried very many remedies, and medical Administrations, but without much benifit, at last he was somewhat eased by the use of Spaw-waters, and from thence by degrees finding himself better he became free from those grievous Symptoms, however, he still liv'd obnoxious to the *hypochondriac* Distemper.

2. *Observation.* A Certain young Academic, originally of a Sanguine temper, fair, of a florishing Countenance, excellent disposition, and mild, by reason of immoderate and untimely Studies, in the mean time exercise, and good order of dyet being wholly neglected, had contracted an obstruction of the Spleen, or some other morbid distemper of that Inward: For he had almost continually infesting him, an inflation, and tumor of the left *hypochondrium*, with a most heavy *Pain*. After he had laboured with this sort of Distemper, about half a year, he began to complain of a frequent giddiness, a blindness of his eyes, an unquietness of his minde, and of disturbed sleeps: Which Symptoms were then plainly imputed to vapours arising from the Spleen: but after that followed, a trembling of the heart, with a frequent *deliquium* of the Spirits, a pulsation of the *hypochondrium*, and at length pains, and Contractions in the outward members, with a frequent

quent ſtupor, and a ſenſe of pricking running up and down here and there: and laſt of all, being broken with a world of evills, contrary to his *genius*, and native Diſpoſition, he became greatly hypochondriacall.

That I may diſpatch the Pathologie of this Caſe in a word, it appears here plain enough, that the Spleen was firſt of all in fault; by whoſe fault, when the bloody maſs was depraved, the taint creeping from thence, into the humour watring the brain and nervous ſtock, and infecting it, did induce the aforeſaid Convulſive Symptoms.

The Method of Curing the Hypochondriac Diſtempers.

The Curatory Method to be uſed againſt the hypochondriacal Diſtempers requires chiefly theſe four generall Indications. *viz.* In the firſt place, that the Impediments of the Cure may be taken away, the Intention of which chiefly reſpects the purging, and preſerving the firſt paſſages. Secondly, it muſt be endeavour'd that the obſtructions of the Spleen, may be Corrected. Thirdly, that both the recrements of the bloody maſs may be purged forth, and that its due diſpoſition may be reſtored. Fourthly, and laſtly, that the enormities of the brain and nervous ſtock, and alſo of the watering humour, and the inhabiting Spirits, contracted by the fault of the blood, and Spleen, may be amended, or taken away: when any of theſe Intentions, or all of them together, ſhall be endeavoured at, fit times ſhould be choſen, in which each being ſingly propoſed, may be performed, without any neglect or hindrance of the reſt.

8. As to the firſt Indication, when a great load of crude or aduſt matter, is wont to be laid up in the firſt paſſages, and when the tone of the Ventricle us'd to be ſpoyled, and its ferment variouſly perverted, againſt every one of theſe kindes of evills, you muſt bring timely help, with fit remedies; therefore, gentle and moderate evacuations, both by Vomit if it proſpers well, and by Stool, ought to be adminiſtred: For ſuch, whoſe ſtomach eaſily caſts forth its contents upwards, I perſwade, that once in a month Vomiting ſhould be ſeveral times provoked by taking *Liquor of Squills*, or *Salt of Vitriol*, or by drinking plentifully ſmall beer poſſet-drink, or warm water; in the time between, a gentle purge, and only a little moving is to be orderd often: For this eud, The pills T*artareous*, of *Bontius*, or Stomach-pills with Gums, or our ſolutive extract, may be of uſe. Take of the beſt *Senna* ℥i, of *Rhubarb* ʒvi, of *Epithim* ʒiii, of *yellow-Sanders* ʒii, of the *Salt of wormwood* ʒii, of *Celtic Spike* ʒi, being cut and bruſed, let them be digeſted in x ounces of *White wine*, and as mnch of fumitory water, for 48 hours, let the clear ſtraining be evaporated, with the heat of a gentle bath, to the conſiſtency of an extract, adding towards the end, of the powders of *Senna*, of *Rhubarb*, and *cream of Tartar* each ʒii, let them be bruſed together in a glaſs morter, and reduced to the conſiſtency of Pills. The Doſe ʒß, ℈ii, or ʒi, the Remedies reſpecting the tone, and ferment of the ventricle, as they are manifold and divers, out of them the moſt fit or commodious for the Diſpoſition of the Ventricle, are to be choſen; for to this bitter things, to that Saltiſh, to another ſharp and perhaps biting things, are deſirable. Among the number of theſe kinds of medicines, (which are commonly called Digeſtives) are *Elixir Proprietatis*, *Tinctura Sacra*, *powder of Aron* Compound, *Salt of Wormwood*, *Cream of Tartar*, *Tartar vitriolat*,, *Vitriol of Steel*, with many others. Beſides theſe inward Remedies, alſo external applications do often bring help: Becauſe the Stomach being ill affected, a fomentation of *white-wine*, with *wormwood*, *century*, and other bitter plants boyled therein, alſo oyntments, or plaiſters, often bring help: Concerning which, there will be no need here to diſcourſe particularly; and to preſcribe forms of the Medicines themſelves.

2. The ſecond Indicatiou, for the mending the vices of the Spleen, (to wit, if there ſhall be in the ſame any obſtruction, Tumour, or pain, or ſimple dyſcraſie or Intemperament,) is wont to be performed, or at leaſt attempted, by Remedies both internal, and exrernal: Thoſe which are of the former Sort, fall in with thoſe indicated in the 3d place, (to wit, with ſuch, as for the purifying the Blood is intended) becauſe, when chiefly, or almoſt all, that which is carried, or born to the Spleen, is done by the paſſage of the blood, the irrigularities of the *Latex* of this, as well as of that Inward, by a Social labour, ought to be cured, with the joynt ſtrength of Medicines; by what means is ſhown by and by. In the mean time, ſome external Applications, under the form of a plaiſter, or an oyutment, or a fomentation, more neerly and immediatly reſpect the bo-

dy of the Spleen, and often bring notable help, forasmuch as they discuss tumors, and allay the Convulsive Distempers, and quiet them. Great plenty of these kinde of outward medicines, are every where extant among Authors, the choyce of which ought to be made, according to the various passions of the Spleen, or the divers Constitutions of the Patient, so that there will be no need here, to shew their particular forms.

3. The Remedies indicated in the 3d place, to wit, which take away the dyscrasies or evill temper of the blood, contracted from the vice of the Spleen, and also clear the primary fault of the Spleen, are of a manifold, and divers kinde, and manner, the choice of which ought to be administred, according to the various infection of this, or that: of these, some are compounded, and prepared according to the prescription of Physitians, as *Electuaries*, *Powders*, *Apozems*, *Tinstures*, *Infusions*, and the like; others more simple, as *whey*, *asses milk*, *Spaw-waters*, and *Bathes*.

There are two chief Cases of sick people, in which magisterial Remedies ought to be all accommodated, according to their strength and quallities: to wit, either the blood is thick, coldish, and earthy, with the Spleen being obstructed, which requires more hot, fermenting, and chiefly Chalybiate medicines; or the blood being clearly adust, and hot, ferments too much, and together greatly troubles the *hypochondria*, and in them, the blood and humours boyl up; in which state, Remedies only temperate, and allaying the fermenting, and immoderate boyling of the humours, are to be chosen, where chalibiats are wholly to be avoided.

When therefore to a cold ventricle, cold discrasies or evill temperaments, of the blood and Spleen also happen, I am wont to prescribe, according to the following forms.

Take of the *Troches of Rhubarb*, of the *Powder of the root of Aron*, of *winteran Bark*, each ʒii, of the *root of virginian Snakeweed*, *Centrayerva*, *Diatrion Santulon*, of *Crabs eyes*, each ʒi, of the *extract of Gentian*, of *Century*, each ʒiß, of *ammoniae*, dissolved in the water of *Earth worms*, what will suffice to make a mass of Pills: let them take 4 pills in the morning, and at 4 a clock in the afternoon, drinking after them a little draught, of *wormwood-wine*, or *chalibiate wine*, with moderate exercise.

Take of the *Conserves* of the *yellow of Oranges*, and of *Lemons*, each ʒiii, of preserved *mirabolans*, *n.* ii, of the *Species* of *aromaticum Rosatum*, of *winteran Bark*, each ʒii, of the *Salt of wormwood* ʒii, of the *vitriol of Steel* ʒi, (or *Steel prepared* ʒiii.) with what will suffice of the *Syrrop of Citron rines*, make an Electuary, To be taken twice a day, drinking after it a draught of *wormwood-wine*, or of the Infusion of the *herb* or *flowers* of *Tamarisk*.

For those who are not pleas'd, but with medicines in an elegant form, and in a very little quantity, the tinctures of *Antimony*, and of *Corrall*, also of *Steel*, with the *Spirit of wine*, (the body being first dissolved by a proper *menstrum*, and reduced to a *Calx*) are convenient: as also the *Spirits of Sut*, of *blood*, or of *harts-horn*, to be taken twice a day, with a proper liquor, to 12. drops, more or less, are of known benefit, above any other medicine that I know of: moreover the often drinking of *Coffee*, also that made of the Infusion of the leaves of *Thea*, gives ease to some.

If that the fervor of the blood, and too fermenting, with the trouble of the Spleen, and unquietness of the minde, be joyned to the hypochondriac Distemper.

Take of the *Conserves of hyps* or *Conaradine*, ℥vi. (or of the flowers of *Tamarisk*, and the leaves of *wood-Sorrel*, each ℥iii.) of the *Species* of *Diarrodon Abbatis*, of the confection of *Alkermis*, each ʒi, of the *powder of Ivory* ʒiß, of *Pearls* ʒß. of the *Salt of Tamarisk*, and *wormwood*, each ʒi. with what will suffice of the *Syrrop* of *green Citrons*,, or *Clove-Gilliflowers*, make an Opiate, to be taken twice in a day, the quantity of a nutmeg.

Take of the *powder of Ivory*, ʒii. of the *Powder* of *Pearls*, ʒi. of the *Species* of *diarrhodon Abbatis*, of *Diamagarit frigida*, each ʒiß. make a fine powder, add of *white Sugar*, dissolved in *Baume-water*, and boyled to the consistency of Tablets ℥ vi. make thereof according to Art, Lozenges, or little cakes: take ʒiß or ʒii twice a day. To these, and other medicines of this nature, may be joyned the use

uſe of Spaw-waters, which indeed, in either, yea, in all caſes, of hypochondriac Melancholly, are almoſt always taken with good ſucceſs: For want of theſe waters, our artificiall Spaw-waters, may be conveniently ordered, yea, and whey, and if any notable atrophie be, let Aſſes milk be dayly taken.

Beſides, theſe inward Remedies, and other outward Applications, before-recited, *Phlebotomie*, or the taking away of blood with Leeches, from the ſedal veines, may be of uſe frequently: yea, ſometimes it may be convenient, to open the Salvatella Vein, according to the preſcript of the Ancients: Beſides Cauteries, or Iſſues, which may continually carry forth the aduſt recrements of the blood, and by degrees excern them, are wont to be benificiall almoſt to all.

4. The fourth Indication, reſpecting the affections of the brain, and nervous ſtock, or the Convulſive Symptoms having relation to or coming upon the former, is rarely in uſe of it ſelf, and apart from the others, but that Remedies deſtinated to this end, are complicated with thoſe aboveſaid. Liquors indued with a volatile Salt, or anarmoniac, as *Spirits of Harts-horn*, and *Sut*, are highly neceſſary for this Intention, as alſo the reſt but now recitied; wherefore ſuch Remedies, unleſs any thing ſhall ſhew the contrary, may be dayly given at fit hours. Further, when Spaw-waters are drunk, let tablets or pills, ſuch as are above-preſcribed, for the Convulſive diſtempers, be taken at leaſt twice in a day. In the frequent turning, and giddineſs, alſo in the paſſions of the heart, the ſinking down of the Spirits, with dread, and as it were a fear of Death, juſt ſeizing on one, I have known very often, great help to be had, by the uſe of Chalibeat, or ſteel Medicines.

The preparations and effects of Steel Medicines unfolded.

Since we have made mention ſo often, of Chalibiat or ſteel-medicins, it will be worth our while, to inquire into their various preparations, and for that reaſon their divers manners of effects, which they are wont to produce in the humane body, that it may from hence appear, by what means, and for what reſpects, theſe or thoſe preparations of ron, are greatly profitable to ſome hypochondriacks, and to others as much hurtfull.

The virtue and operation of Chalybeat, or ſteel'd mecicines, depends upon the porticles of the concerts, being after a various manner diſſolved, unfolded, and brought forth into act: For ſteel, or iron, conſiſts chiefly of a *Salt Sulphur*, and *Earth*: and but ſlenderly indued with Spirits and water: But the particles of the former Elements, chiefly the Sulphureous, and ſaline, being in their mixture combined together, with the Earth, remain altogether fixed, and ſluggiſh, but being ſoluted, and pulled one from another, they come to be of a very efficacious Energy.

The aforeſaid particles are diſſolved in a twofold manner, and ſet into the Liberty of acting: *viz.* either by Art, whilſt medicins are prepared, or by Nature after they are taken inwardly; for the metallic Body, is wont to be diſſolved, and eaten, by the ferment of the ventricle, juſt like a Chymical *menſtrum*: we will conſider the ſeveral *Species* of either, and their manner of being made, that it may appear, what alteration is impreſſed, on the ſteeled medicine, in the preparation; and what effects every preparation of it, doth impreſſe on mans Body.

The moſt ſimple way of preparing Iron, is a diviſion of its body, into little integral parts, with a file, which reſemble the nature of the whole mixture, and contain both little ſulpureous bodies, and ſaline, combined among themſelves, and with other terreſtrial. The filings of Iron being inwardly taken, is diſſolved by the ferment of the ventricle, as it were by an acid *menſtrum*; the ſignes of which are, both a ſulphureous and uuſavorie belching, as from the eating of hard eggs, alſo the blackneſs of the ordure, from ſteel being diſſolved within the *Viſcera* of Concoction, active particles, both Sulphureous and Saline, Plentifully ſally forth, and being involved with the nutritious juice, are carried into the blood; which as they excell in a divers virtue, do often conſpire, as it were with the joynt forces of either, to bring benefit to the ſick. The Sulphureous little bodies being brought to the blood, add to it a new, and more plentifull Proviſion of Sulphur, wherefore its maſs, if before it was poor and liveleſs, doth nimbly ferment within its veſſells, and being inkindled farther in the heart, acquires a more intenſe heat, yea, and a deeper colour; for it is ſo obſerved, in many affected with the dropſy, ariſing from white phlegm, the Pica or evill

longings, or green-sickness, to have a pale countenance, cold bloud, and waterish; but by the use of steel, the countenance soon to be more florid, and the blood to be imbued with a more intense tincture, and heat: moreover, from the filing of Iron, dissolved in the ventricle, also Saline particles are brought forth, and often they bestow a more plentifull fruit or increase, both on the solid parts, and on the humors; for since their natures are vitriolick, and stiptic or binding, they bind together and strengthen the too lax, and weakned *fibres* of the *Viscera*, and to restore the broken tone: Besides these Saline particles, inhibit the force of the blood; repress it from too much heat, and boyling up, and froth, and retain it in an equall circulation: Besides (which is their chief virtue) they contract and straiten the too loose, open, and gaping little mouths of the Arteries; that, for that reason, neither the *Serum*, nor the bloody *latex*, may sweat out, or be broke off, from the file of its circuit: Wherefore in the Dropsie, and great bleedings, Remedies, imbued with the Saline particles of Iron, are of famous and efficacious use, for very many Diseases proceed from this cause, forasmuch as the little mouths of the Arteries, being too open, and the interspaces of the vessells above measure loosned, the *serum* or bloody *latex* breaks forth; which kinde of Affections, the Vitriollic Particles of Steel, do often help, by binding and corroborating, the sanguiferous Vessells, and nervous *fibres*.

After this manner, the *filings of Steel*, being taken inwardly, seems at once to add to the blood, both spurs, and a bridle. But forasmuch, as from this medicine, an incitation, much more than a restriction, doth arise, therefore it ought to be given only to them, whose blood is very thick, and cold, as country people and strong persons; in very hot, and spirituous bloud, and in hot inwards, 'tis no ways convenient: moreover, in delicate persons, and men of a more tender constitution, 'tis dangerous, lest the little portions of the steel, when they cannot be sufficiently dissolved, should like fragments of glass, be driven into the membranes of the *Viscera*, and there pertinaciously sticking, produce some ulcer, or deadly torments, which indeed I have known sometimes to happen.

2. After the filing of Iron, the next way of preparing it, is calcining it with Sulphur, to wit, let thin peeces of steel, being strongly fired, be laid upon a roler of *Sulphur*, that the mettle may melt into little round balls, which are to be calcined to the consumption of the Sulphur, and pounded in a morter, are to be reduced into a subtle powder, which is of choice use. In this preparation of Iron, some sulphureous particles are exhaled, the signe of which is, that this powder, an acid liquor being poured upon it, much less boyls up, or grows hot than the limature or filing of Iron: but being taken by the same mouth, it excites a Sulphureons savour. In the mean time, in this preparation, the saline particles, seem to be somewhat augmented, by new ones sticking to them, from the mettall burning with Sulphur, so that active particles of either kinde, to wit, Sulphureous and Saline, come almost to an *Æquilibrium*: and when by this means, this medicine, the substance of the mettle being loosned, may be finely poudered, it becomes of far more excellent use, than the filings of Iron: In most Cases, where steel ought to be given in substance, as in a Cachexie or a fullness of evill humours, the longings of maids or the green-gckness, and such like, this medicine is convenient to be used.

3. In the third place, follows the preparation of steel with vinegar: to wit, the filings of the whole steel, is moysten'd with vinegar, and dryed, till it may be reduced into an impalpable powder: in this preparation, the Sulphureous particles are yet much more, yea, as to the greatest part evaporated, only a few being left, in the mean time, the Saline, by reason of others sticking to them, from the vinegar, are much encreased, which are mingled with the terrene particles: This chalibiated powder, very little or nothing froths, or boyles up, a sharp liquor being sprinkled upon it, also being taken at the mouth, has with it scarce any sulphureous Savour: wherefore, it conduces less, to the taking away of the obstructions of the Bowells, or to the restoring the ferment of the blood: nevertheless, in a more hot Constitution, in hemorrhages or fluxes of Blood, and the hypochondriac Distemper, it is wont to be administred with greater succes, then the former preparations.

4ly. Follows the rust of Iron, which being an extract of the metallic body, seems to be as it were a fifth Effence: because, in this excrescency, some particles

cles of every kinde, to wit, ſulphureous, ſaline, and terrene, being looſned from the whole ſubſtance, are combined among themſelves; and conſtitute as it were a new mixture, more ſubtile, and defæcated or clearer from dreggs: For that in this concrete, there remains leſs particles of ſulphur, therefore it doth not ſo potently ferment the blood, or take away the obſtructions of the *Viſcera*, as ſteel prepared with ſulphur; but in more hot diſtempers of the parts, or humours, it egregiouſly performs the requiſite Intentions, of a ſteeled Medicine.

To this Claſs may be referred by right, our preparation of ſteel, to wit, in which all the particles of the mettal, being looſned from the bond of mixture, are contained together: which notwithſtanding, (the concrete being firſt reduced into pouder) and immediatly diſſolved, in any water or Menſtruum. This powder being inwardly taken hath the like vertue as ſteel prepared with ſulphur; but to the liquor or menſtruum, in which it is diſſolved, it imparts almoſt only ſaline, or chiefly vitriolic particles, the ſulphureous flying away, and the terene ſinking to the bottom. I am wont to give in great quantity, and not ſeldom with excellent ſucceſs, common water impregnated with the diſſolution of this, inſtead of the natural acidulous or ſpawiſh waters: moreover, I make thereof medicated wine, beer, cyder, whey, or other Liquors, this pouder being diſſolved in them; and preſcribe them to be taken, for ſeveral intricate Intentions: So much for the preparations of Iron, in which the elementary particles of every kinde, are comprehended in a various proportion: There remain others, in which the particles almoſt only of one kinde, to wit, the ſaline, or earthie, are left, the reſt, as to the greateſt part, being driven forth: of which ſort, are chiefly vitriol, or the Salt of ſteel.

5. For the making the vitriol of ſteel, firſt, the mettal is wont to be eaten thorow, with a very ſharp and corroſive Liquor, and to be diſſolved into elementary parts: In the diſſolving, the ſaline particles of the menſtruum, are joyned to the other ſalines of the Iron, and are with them intimately combined; in the mean time, the remaining ſulphureous, and terrene, being laid aſide, and excluded from their company; then common water being poured to this ſolution, the ſalts of either kinde being combined, are imbibed by the Liquor, and that being laſtly filtrated, and evaporated, they are reduced into chriſtalls. This kinde of making of ſalt or ſalification, ſuccedes, if you do it, either with the Spirit of vitriol, the oyle of ſulphur, or ſtygian water, or any others, diſtilled from the ſtagmas of mineralls: Yea, *Sal Armoniac* only, being ſoluted by melting, diſſolves Iron after the ſame manner, and cauſes it to Chryſtalize.

Salt of Steel thus prepared, hath a ſweetiſh taſte, with a certain ſharp ſtipticity or binding, and participates much of the nature of *vitriol*, that it ſeems not to differ much from Verdigreaſe. Taken inwardly for a medicine, it ſomewhat ferments the humors, and powerfully bindes the nervous *fibres*: for cold Cachecical, and Phlegmatic people, this medicine is not convenient, becauſe there are in it no particles of *Sulphur*: but it is often adminiſtred with ſucceſſe, in hot diſtempers of the bowels, where there is a predominancy of aduſt *Sulphur* and in wandring effervеſcencies, in ſcorbutical, and unequall heats, both of the blood and nervous ſtock, by it ſelf, or mixed with other medicines, as an enforcement: but yet in more tender Conſtitutions, 'tis dangerous, leſt the tone and *fibres* of the ventricle ſhould be hurt, by its acrimony, and too great conſtriction or aſtringency.

6. In the laſt place, follows the aſtringent *Crocus Martis*, or the *Crocus of Steel*, prepared by fire, through a long Calcination, *viz.* The filings, the off-ſcourings, or thin plates of Iron, ſhould be ſo placed in a reverberating fornace, that they may be continually heated, by a moſt ſtrong flame: The filing being thus expoſed to the naked fire; firſt of all it grows reddiſh, and runs together into little hard round balls; but after 3. or 4. days, ſwelling up ſuddenly into an higher heap, it becomes extream light, impalpable, and of a moſt curious purple Colour: In this preparation, the Sulphureous and ſaline particles, whilſt by the force of the fire, they begin to come away from the concreet, do mutually take hold one of another, and ſo being combined together, grow into little balls; but afterwards, thoſe particles, both Saline and Sulphureous, being wholly profligated, and fiery particles ſucceeding in their place, the whole maſs ſwelling up into a bulk, and made as it were ſpungie, becomes moſt light.

A Medicine thus prepared, in some Cases, is of most excellent use, and second to none of the Chalybeats: to wit, almost in all extravasations, or too great eruptions of the *Serum* and blood, as in outward *hæmorrhages*, or in inward bleedings, in the *Diarrhæa*, the *Diabatis*, and in a vehement Catarrh; also I have known no remedy better than this, in the *Ascitis*, or in the beginning of a Dropsie: and this also, I have heard to be highly approved of lately by a most famous and expert Physitian, of our own Country: Concerning which medicine notwithstanding, since it is wholly destitute, both of Saline and sulphureous Particles, and consists almost only of earthly and fiery particles, it is very ambiguous, by what faculty it operates, and produces so praise-worthy an effect in man's body: for there seems to be in this, left no more *Caput mortuum*, or dead head, or *terra damnata*, then in vitriol, or in any of the other mettalls, distilled be a most intense fire. As to this if I may Conjecture, it seems first, that to this preparation, some Activity is due, whereby it exerts it self, and unfolds its virtues, either by shutting up obstructions, or by binding together the Vessells, or nervous *fibres* of the *Viscera*, from the fiery particles, shut up in the most fixed earth, and from them breaking forth within the body: But the chiefest reason of helping consists in this, that the earthy particles, the Saline (by which they were strickly held) being wholly gone, desire greedily to be reunited to them, or such like: Wherefore, this *Crocus martis*, being immersed in our Bodies, snatches to it self, whatsoever Salts it meets with, and intimately binds them, and so, while it sucks up like a sponge, very many saline particles, it takes away many enormities, arising chiefly from the flux of the Salts. By this means, *Burnt harts-horn*, *Spodium*, and *Antimony Diaphoretic*, when they bring help exert or put forth their virtues.

CHAPTER. XII.

Of the Convulsive Cough and Asthma.

An example of a Cough meerly Convulsive.

THe history before related, doth clearly manifest, that sometimes a Cough may be caused, without any great fault of the Lungs, by reason of the sliding down of the morbific matter, upon the pneumonick nerves, or those belonging to respiration: to wit, where it was shown, in the Case of the noble Virgin, labouring with Convulsive fits, and also with a grievous and continual giddiness, that, when by the prescript of the Physitian, a fomentation of Cephalic Decoction, was applyed to her head, presently the Giddiness ceas'd, and in its place follow'd a great Cough, without any Spitting, but night and day, almost perpetually troubling her: which without doubt hapned, by reason of the Convulsive matter, being driven from the brain, into the beginnings of the nerves: This kinde of example, of a Cough meerly Convulsive, more rarely happens, in persons of ripe years, as the like distemper I have not often seen: But in children 'tis usual, (also sometimes I have known it in Men) for a cough to arise, from a serous Colluvies overflowing the Lungs: which, when at first it was Simple, and moderate, afterwards it became vehement, and Convulsive; so that in Coughing the *Diaphragma* being drawn upwards, and held in a long *Systole*, or frequently repeated, the Lungs being greatly straitned, were much hindred in their motion. In the mean time, by reason of the breathing being hindred, and the blood being restrained within the *Præcordia*, and for that cause stagnating in other places, the sick were in danger of being choaked, and often acquired a livid, or dead countenance. But in this Case, besides the Convulsions raised up about the *Præcordia*, by the force of Coughing, the Ventricle also, being often brought into a consent, cast forth by vomit, whatever it contained in its bosom: yea, and I know in some tender ones, after this manner affected, the Disease wandring from thence into other parts, did raise up Convulsive motions in the Face, eyes, and limbs, and at length became deadly. This kinde of Convulsive Cough is very frequent among children, and some years lays hold

This distemper frequent enough in children.

on

on so many, that it seems to be plainly Epidemical; when it roots it self, it is very difficult to be cured, by Remedies, yea often being long protracted, it is hardly otherwise to be cured, but by the state of the year being changed.

The reason of it.

If the causes of the aforesaid Case be inquired into, it will be so plain, to refer the procatartic or more remote cause, to the redundancy of the Serous humour in the bloody mass, and in some sort in the whole body; a portion of which matter, dropping forth from the little mouths of the Arteries, on the Lungs, creates the ordinary Cough; afterwards, when the serous Colluvies or heap of waters yet exuberateing in the Blood, and stuffed with Convulsive particles, is also heaped up within the head, the same entring the pneumonic nerves, increases the simple, into a Convulsive Cough: For when those nerves, being irritated first about their extremities, are exercised above measure, for that reason they more easily imbibe the Convulsive matter, laid up nigh their beginnings: and so, when at length, they are driven into irregular motions, in two places, to wit, in the head, and at the tale, and that for two distinct causes, *viz.* from the irritation of the Spirits, and from their explosion; it is no wonder, if the Cough, at first Common, being afterwards brought into this evill state, becomes so cruel and Convulsive: Moreover, when it sometimes happens, that the same matter, heaped up in the head, does enter some other nerve, therefore Convulsive passions of another manner, often come upon the Convulsive Cough.

The Convulsion Asthma.

Having shown after this manner, that a cough doth arise, not only, nor always by the fault of the Lungs, but sometimes from a solitary Convulsive cause, but oftener superinduced by this, on a pneumatic Distemper: also we do not doubt to determine almost the same thing, concerning another certain Distemper of the *Thorax*, to wit, the *Asthma*: For whether this Disease be continuall, or periodical, in either Case, the Symptom chiefly urging, is difficult Breathing; which indeed seems to be excited for this reason, because the Lungs being too much inflated, and distended, extremely fills the Cavity of the *Thorax*, neither do they fall down as they should do, by turns: hence the Spirit or breath remaining within, is not sent forth freely enough, neither indeed can fresh aire be easily induced, by reason the space is before filled: whilest the Lungs are so longer contained in a continual, or very little remiss Diastole, oftentimes the *Diaphragma*, is urged contrary to its manner, into a violent Systole, and being drawn upwards, is wont more and more to lift up the Lungs, and to hinder their falling down; whereby it comes to pass, that respiration becoms yet more difficult, and more laborious.

Sometimes it depends of the Lungs, together with the nerves being affected.

We easily believe, that this kinde of hard breathing Distemper, doth sometimes happen by the fault of the Lungs, because anatomical Inspection hath plainly detected it: For if a great Serous Colluvies, being layd up in the *Thorax*, very much stuffs the Lungs, and so much obstructs all their pores and passages, that the blood being hindred in its Circute, cannot freely pass thorow the Pneumonic Vessells, for that reason indeed, such like anhelous Distempers are sometimes made: Then, as often as the blood growing more hot and rarified, by exercise or the heat of the Bed, requires a larger space for its Circulation, within the Lungs; then presently from such an occasion, a more frequent Respiration, or an asthmatical fit is stirred up: If beside this morbid Dispositon of the Breast, the Sanguineous mass, also abounding with a serous water, should be apt to sudden fluxions and effervescencies of the Serum, from hence also, by reason of the violent course of the Serum growing hot, into the Lungs, being before obstructed, and greatly filled, very often most grievous assaults of this Disease, and almost suffocating do happen. Moreover, sometimes, beside, the roots of the asthma (as it is said) being fixed about the *Præcordia*, certain shoots of the same diseale, budding forth from the head, meet with the former, and being complicated with them, produce the more cruel fruits of the *Dyspnæa*, or want of Breath. For, because the Lungs being stuffed with *Serum*, another quantity of the same, more largely redounding in the blood, being imbued with Convulsive particles, is poured on the head, the same more readily entring the pnenmonic nerves, than others, causes the *Asthma* of the *Thorax*, at first Simple and modetate, to become periodically vehement, and Convulsive.

Of these kinde of Distempers, *viz.* the *Dyspnæa*, being excited by the singular fault of the Lungs, and with a Companion, very many instances, and examples have

have fallen under our observation, and do almost dayly happen. For there is nothing more usual, then for those that are sick of an inveterate cough, or any other evill disposition of the Lungs, at length the Dropsie, or Scurvie hapning to become Asthmatick, to wit, when the Blood being made much more impure, lays up also its serous dreggs in the head, these more readily, and indeed more easily enter then others, the pnenmonic nerves, as being weaker, and often irritated neer their extremities, and in them do heap up matter, for a Convulsive *Dyspnæa*.

An Asthma sometimes meerly Convulsive proceeds from the nerves only being affected.

Further, sometimes I have observed, most grievous fits of an *Asthma* to have hapned, without any notable fault of the Lungs, so that truly I did think that this disease was sometimes meerly Convulsive, and its fits only excited, because the serous colluvies or watery heap, being stufft with, explosive particles, entring into the nerves, performing the Diastole of the Lungs, grows to the Spirits therein flowing, which being afterwards struck off together, and for a long while, by reason of plentitude or irritation, the Lungs are detained as it were inflated, and stiff, so that they can perform neither the offices of drawing in, or of breathing out: But the fit being finished, a free and equal respiration follow'd, as before the fit began, and no cough, or signs of a sickly disposition of the Lungs, did appear. As I have observed this kinde of *Dyspnæa* or difficult breathing meerly Convulsive, to have hapned in many, I will here shew you one or two histories of it.

A certain strong and fat Gentleman, having used for some time a more full and inordinate Diet, without any exercise, began to be ill about the beginning of the winter: at first he was troubled with a pain and heavinesse of his head, with a grear giddinesse, and fear of swounding, and believing himself just about to dye, being otherways healthfull; within a few days, these Symptoms pass'd into an apparent *Stupor*, or rather Lethargie: he being let blood in his Arm, I caused carefully to be applied Cupping-glasses, Vesicatories, and sharp Clysters, with many other Remedies: In the space of 42. hours coming to himself, he was sensible, and shook off all torpor or drousinesse. But although his brain was cleared, yet he was taken with a great weakness, and numbnesse in his members which Distempers however were shortly cured, with antiparyletic and antiscorbutic Remedies: But after a fortnight, he began again to complain of an heavinesse and giddinesse in his head, then the next day after, he fell into a horrid *Asthma*: that the Lungs being suddenly inflated, and endeavouring to come upwards, the Breath, which was very quick and laborious, was hindred, and not being able to come forth, he was in danger every minute of an hour to be choaked. This fit as it was cruel, so it pass'd over within 12. hours, without any spitting, cough, or vomit, and then, within a weeks space, he lost all the trouble of his breast; but then the like fit of the *Dyspnæa* or difficult breathing returning, exercis'd him somewhat more gently; and afterwards, he was wont to be troubled with such a fit of the *Asthma*, nigh to the great mutations of the Air, chiefly in great cold, or the falling of Snow.

2. Observation.

I knew another Gentleman, sick of an inveterate Scurvy, who having no manner of Cough, was troubled now with a great head-ach, and for many days with a giddinesse or *Vertigo*, then at another time, being free from those Symptoms, he was taken with a most cruell fit of the *Asthma*, and he endured these Distempers, now this, now that, frequently, but especially about the greater tropicks of the year.

The Reason:

It is not to be doubted, but in the aforesaid Cases, those fits of the *Asthma* did wholly depend, on the Convulsive matter, being fallen into the nerves, serving to the stretching forth of the Lungs, which cleaving to the Spirits, and being by them struct off, or explosed, by reason of plentitude or irritation, caused the *Præcordia* to be lifted uywards, and as it were inflated, and by that means hindred, from its reciprocal motion.

An Asthma sometimes excited by reason of the Bronchia being Convulsively affected.

Moreover, we suppose, that such a kinde of Convulsive *Dyspnæa* or difficult breathing, is sometimes excited, by reason of the *bronchia* of the *Trachea* (or the sharp arteries of the Throat) being too much streightned, and often almost drawn together: we have shown in our discourse of the Nerves, that very many branches of nervous *fibres*, and of the nerves, do every where embrace all the ramifications of the asper Arterie, and bind them about, which nerves if it happen,

pen, that they, being possessed by the morbific matter, should be irritated into frequent Convulsions, for that reason it follows, that the channells or passages which they compass about, must be greatly bound together, and in some places wholly shut up.

3 *Observation.*

There was a very choyce Virgin, of a tender constitution, and of a flourishing countenance, scarce past the second lustre of her Age, (*i.e.* about 12. years old) that began to be grievously tormented with *Asthma* fits; and before she was entrusted to my cure, she had liv'd obnoxious to them at least 4. years. sometimes she remained free, from any fit of this disease, for two or three months: yet oftentimes, by reason of errors in Diet, or the great mutations of the year, or the air, she fell into most cruel fits of the *Dyspnæa* or difficult breathing: So that her Lungs being inflated, and carried upwards towards her throat, and there held almost in a continual Diastole, she could hardly, nay, not at all breathe; in the mean time, for that respiration might be somehow made, the *Diaphragma* and the muscles of the breast were exercised with repeated endeavours of motions. This kinde of fit by degrees remitting, within 7 or 8. hours, at length gave over; but then after a week or two, it was wont to come again, either of it self, or from any the least occasion; after that the force of the Disease, its matter being bestow'd on very many of these kinde of fits, pass'd away, this excellent virgin was well enough for many weeks, yea sometimes months after, and breath'd freely, without any fault of the *Thorax*. For this person, I instituted this following method, Spring and fall, and now it is more than two years, since she has had any fit of this Distemper.

Take of our *Sulphur of Antimony*, gr. vi. of *Cream of tartar*, vi, grains, mix them: Let it be given in the pap of a rosted apple, with this medicine she was wont to vomit 4. or 5. times: four days after, she took this cathartic, which was wont to be repeated, twice, after 6. or 7. days between: Take *Calomelun* xii. grains, of the *Resin of Jolop*, v. grains, of *castor* gr. iiii. with what will suffice of *Ammoniac* dissolved, make iii. pills: every day besides, she took morning and evening, of the tincture of *Antimony*, grains xii. in a Spoonfull of the following Julap, drinking after it 6. or 7. Spoonfulls of the same. Take of the *water of Snailes*, ℥vi. of *earth-worms* ℥iiii. of *water of penny-royal*, and *rue*, each, ℥iii. of hysterical water, ℥iii. of *Castor* tyed in a knot, and hung in the glass, ʒß. of *white-sugar* ℥i. mix them in the glass, and make a Julap.

4. *Observation.*

About the Autumn of the last year, another noble Virgin, being sick after the same manner, *viz.* with a Periodical *Asthma*, I was sent for to cure her, who received great help by the aforesaid Remedies, being used in a little lesser dose, and the same repeated at the first of the Spring.

An Anatomical Observation

In these Cases also, nothing seems to appear more clearly, than that the cause of the Disease, without any phlegm or viscous humour, being impacted in the Lungs, as is commonly beleeved, doth subsist within the nervous stock; and that this kind of *Dyspnæa* or difficult breathing, meerly convulsive, is excited, by reason of the Pneumonic nervs, being possessed by the Convulsive Distemper. The verity of this may be yet more clearly evinced, by an anatomical observation, lately Comunicated to me, by the learned Physitian Doctor *Walter Needham*. That most famous man told me, that he knew a Butcher of *Wallsallen* in the County of *Stafford*, who when he had been long sick of a periodical *Asthma*, returning within 14. or 20 days at fartheſt, at length he dyed in a fit. The Body being opened, all his *Viscera* appeared sound, chiefly his Lungs, neither were there to be seen any signes, either of excrement gathered together in the *Bronchia*, or of the blood restagnating in the veins; this only hapned besides nature, that the bladder of the gall; contained in it many stones. But (added he) the causes unknown to us, certainly not Conspicuous to our eyes, were to be attributed to the nervous stock being affected.

Another Anatomical Observation.

Sometime past I was consulted with, about a noble child, who being about 12. months old, was grievously afflicted with Convulsion fits, and as it were Epileptic, of which he quickly dyed. I often observed, that whilest the Convulsion of the outward parts intermitted, he was taken with a cruel sobbing, or hooping Cough: from whence I suspected, that the morbific matter, was no less fixed in the breast, than in the brain. But after its Death, the body being opened; the Lungs well furnish'd, appeared clear from any fault, that it clearly appeared

peared that this cough meerly Convulsive, was excited by reason of the Distemper of the nervous stock.

As to what respects the Remedies, and curatory means, which ought to be used in the aforesaid cases, when that convulsive Symptoms come upon the Cough, or difficulty of breathing, first excited from the default of the Lungs, and so by reason of the taint, communicated to the brain; it must be carefully heeded, that Convulsive medicines be aptly compounded, with those respecting all the Intentions of the *Thorax*. Yea that sometimes these, sometimes those, being given by themselves, may between whiles fill up the times of curing, it will not be needfull in this place, to bring the bechic, or Pneumonic medicines, and forms of them, since an immense company of them, are extant every where, among Physical Authors. It will be sufficient for our purpose, to add a method of medicine, also some more select Remedies, convenient for the Cough, and *Asthma*, meerly Convulsive.

The cure of the Convulsive Cough.

As to the former Distemper, which is most familiar to children, the cure is difficult, and for the most part not to be performed, but of a long time. The chief Indications, will be to purge forth, both the serous and sharp humours, from the blood and *Viscera*, that their inclination and falling down in the brain, and perhaps also within the breast, may be sometimes prevented; then to Corroberate those parts that they may not easily admit the superfluities, of the boyling Serum. For these ends, vomits and more gentle purges, for the most part are usefull, and in some measure ought to be repeated: Vesecatories are often profitable; yea, if the Disease be contumacious, Issues are to be made in the nape of the neck, or the arm, or about the Armpits. Drink and liquid aliments, are to be taken in a lesser quantity, than usual, and in stead of them, a Bochet is to be used, of *Sarsa*, *China*, *Sanders*, *Shavings of Ivory*, and *harts-horn*, with diuretic, and anticonvulsive Ingredients: In this Case, some remedies as it were special, are greatly commended, of which sort are pixed musk, given in powder, or boyled in milk, and so given dayly in a frequent dose: a decoction or *Syrrop of Castor*, and *Saffron*; decoctions of the *root of Paony*, *Misletow* of the *Oak*, also of *hyssop*, help many; the waters of *black-cherries*, of *Saxifrage*, and of *Snailes*, distilled with *Whey*, and appropriate ingredients, are often taken with succes.

The cure of the Convulsive Asthma.

2. By what method, and with what Remedies, I have cured the periodical *Asthma* in some young ones, hath been already shown, But in most, distemper'd with this Disease the most famous *Riverius* hath observed, a vomit is chiefly helpfull, although he hath not rightly shown the reason: which indeed seems to consist in this, to wit, that this medicine, greatly shaking, and irritation the Emunctories, planted about the first Passages, strongly presses out from them, and carries forth of dores, the recrements of the blood and nervous juice, apt to be troublesome, and to restagnate on the brain, and Nervous stock. *Zacutus* the Lusitanian, highly extolls, and not without reason, a cautery to be made, sometimes in the hinder part of the head, sometimes in the nape of the neck, or about the Armpits: A preparation of *milipedes*, *viz.* in form of a dry powder, or a distilled Liquor, seldom wants succes. For by such like Remedies, the superfluities of the *Serum*, are deduced from the head, and nervous stock, and carried away, thorow the urinary passages: For the same reason, a gentle purge, evacuating the ill juice, is often us'd: for this end, the decoction of an old Cock, with altering medicins, and gently purging, being stowed in its belly, is praysed by many: Besides, the remedies hitherto cited, some others are said to be appropriate, and as it were Specifical to the *Asthma*, of which sort are, the *balsom of Sulphur*, turpintin'd, also *Spirits of Harts-horn*, or of *Sut*, impregnaeed with the same; *Syrop of Tobacco*, of *Ammoniack*, our *diasulphur Lohoch* of *Garlick*, pills of the *roots of Enula Campane* made up with the *milk of Sulphur*; with the *flowers of Benzoin*, with liquid pitch, or liquid amber, with many others, which would be too tedious here to enumerate.

And now the cheif *Species*, and manners of Convulsions, together with the Causes of the Symptoms, and the means of curing, being sufficiently explicated, it is time to put an end to this our Pathologie of the Brain and nervous stock, and to our Discourse of *Convulsive Diseases*.

FINIS.

Since nothing could ſo well expreſs the meaning and intention of the Author, as the very *Latin* and *Greek* words uſed in theſe Tracts, we have continued them expreſly, and though in many places I have given their meaning by *Synonymas*, yet for the benefit of the meer *Engliſh* Readers, we have here compoſed a Table Alphabetically of all the hard *Greek* and *Latin* words, uſed in the whole Volume; as alſo of all Terms of Art, and many other words derived from the *Latin* and *Greek*, though uſual among Scholars, yet not frequently known to the vulgar, and therefore we have fully explained them and rendred them intelligible to the meaneſt Capacity in the following Table.

A TABLE of all the hard words derived from the *Greek* and *Latin*, of all Terms of Art and other words not vulgarly received, with the explanation of them.

A

ABdomen, *The lower part of the Belly from the Navel downwards.*
Ablution, *A waſhing away.*
Accenſion, *An Inkindling.*
Acceſſion, *A coming to or approach.*
Acme, *The height or top of a thing.*
Acid, *Sharp.*
Acidity, *Sharpneſs.*
Acidulæ, *Medicinal waters running forth from Veins of Iron, Copper, and ſuch like, called* Spaws *from that famous place for Mineral-waters, the* Spaw *in* Germany.
Acrimony, *Sharpneſs or ſourneſs rather.*
Actionoboliſm, *An Irradiation of Beams, or ſhooting forth of the ſpirits like beams of the Sun.*
Aconite, *A venomous poiſonous Herb put for* Libbards *bane.*
Acute, *Sharp, or exceſſive painful, or that is quick and dangerous.*
Aculeated, *Made ſharp and prickly like a Needles point.*
Adhæſion, *A ſticking to.*
Adjuted, *Helped.*
Adventitious, *Coming by accident, or by the by.*
Aduſt, *Burnt or parch'd.*
Aduſtion, *A burning or parching.*
Æquilibrium, *An equal or even poiſe when the Balance ſtands bending neither to the one ſide or the other.*
Æquinox, *When the Sun is in the Equinoctial Line and divides the Day and Night into an equal length, which is about the* 12. *of* March *and about the* 12. *of* September.
Ætherial, *Heavenly or belonging to the Air or Skie.*
Ætiologie, *The rendring of the Cauſe or Reaſon of a thing.*
Affection, *Taken for the natural Condition, and often ſignifies ſickneſs or diſeaſe.*
Affected, *Diſtempered or diſeaſed. Sometimes natural diſturbance.*
Affuſion, *A pouring forth of any thing.*
Agaric, *A Drug that purges Phlegm.*
Aggeſtion, *A heaping together of any thing.*
Agitated, *A violent ſhaking or jogging together.*
Alembic, *An Arabic word for a Still uſed by Chymiſts.*
Alexipharmaca, *Medicines againſt Poiſons and Venom.*
Alexiterion, *The ſame, being an Antidote againſt poiſon.*
Alchaliſat, *A ſalt made of the herb* Kali. *Alſo taken and applyed to ſalts made of Herbs and ſhells of Fiſhes.*
Alible, *Nouriſhable, or that nouriſhes.*
Aliment, *Food.*
Alliſion, *A ſtriking or knocking together.*
Aloes, *A juice made out of a bitter herb uſed in purging Medicines, alſo a ſweet wood.*
Amalgama, *A Chymical term for the ſetling and mixture of ſeveral Minerals or Metals, or other things whereby a ſeparation and extraction may be made.*
Ambages, *A compaſſing or going about.*
Ambient, *That invirons or compaſſes one about as the Air.*
Amulets, Pomanders *or* Bracelets *made againſt Witchcraft and Infection and Poiſon.*
Analogy, *Proportion, agreement or likeneſs.*
Analyſis, *The laying open or unfolding of the matter.*
Anatomy, *A diſſecting the Body to ſee the ſeveral parts.*
Anaſarca, *The watry Dropſy ſwelling up the whole fleſh.*
Analeſia, *A ſtupifying diſeaſe that takes away the ſenſe from all parts of the Head.*
Angle, *A Mathematical Term, being the nook or ſpace at the cutting of two lines, and is of ſeveral ſorts. A Corner or nook.*

Anhelous, *Short-winded, or that puffeth for want of breath, that breatheth difficultly.*

Annularie, Annular, } *Ringy, or like Rings.*

Anodynes, *Medicines procuring eaſe from pains by ſleep or other means.*

Anomal, *Irregular, out of order.*

Antaſthmaticks, *Things good againſt the Cough or* Aſthma.

Anterior, *The former.*

Antidote, *A Medicine againſt Poyſon or any other diſeaſe.*

Anticipate, *To go before.*

Antihypnotics, *Medicines given againſt too much ſleeping.*

Antipyreuticon, *A Medicine againſt a Feavour, or a Feaver-Curer.*

Antipyreticks, *Medicines againſt burning Feavers.*

Antiſpaſmodicks, *Medicines againſt Convulſions.*

Anus, *The Fundament or Arſe-hole.*

Aorta, *The great Artery the mother of all the reſt, proceeding from the heart, one branch aſcending, another deſcending.*

Apoplectic, *One ſubject to the Apoplexy.*

Apoplexy, *A Diſeaſe that ſtupifies and takes away ſenſe and motion.*

Apozems, *Decoctions or drinking Medicines made with herbs.*

Appendixes, *Things belonging or depending on another, as the parts about the heart.*

Aquoſity, *Wateriſhneſs.*

Area, *The void ſpace in a figure, as a Triangle or Quadrangle: the plat or floor of any thing.*

Armoniac, *Salt extracted out of ſtones.*

Arteries, *The Veſſels that carry the blood to the heart.*

Arthritick, *Gouty, or belonging to the Gout.*

Arſnick, *Or Orpiment, a poyſonous drug.*

Archeus, *A chief Officer, Workman, or Operator.*

Articulation, *A ſhooting of ſpriggs from the joynts.*

Aſcites, *A kind of Dropſie which ſwells between the skin and the fleſh.*

Aſper, *Sharp, Aſper artery, the wind-pipe.*

Aſſimilation, *A growing or making like.*

Aſſimilate, *To grow or make like.*

Aſthma, *A troubleſom diſeaſe, when the lungs being ſtopped, one cannot take breath.*

Aſthmatical, *Belonging to that diſeaſe, or troubled with it.*

Aſtringent, *Binding.*

Ataxias, *Diſorders, irregularities.*

Atoms, *Small little Bodies, ſuch as Motes in the Sun-ſhine,*

Atrabilous, Atrabilary, } *Belonging to the black Bile or melancholy, or to the melancholic humour.*

Atrophie, *A Diſeaſe cauſing a pining away, or a waſting, or Conſumption of the fleſh.*

Attrition, *A knocking, or bruiſing, or rubbing together.*

Auditory, *An Aſſembly, or thoſe who hear.*

Aurum fulminans, *Or Thundering Gold, a metal prepared by Chymical Art, that being heated goes off like a Gun with a Thundring noiſe.*

Auſtere, *Biting, harſh.*

Axillarie, *Vein is a branch of the* Vena Cava *coming thorow the arm-hole from the channel bone deſcends into the in ſide of the arm.*
Artery ſprings from the left ſide of the Aorta *above the heart, and aſcending obliquely thorow the arm-holes, and thence ſending branches into the upper ribs, ſhoulder & chanel bone, it deſcends down to the bowing of the Elbow.*

Azygos vein, *is a branch of the upper Trunk of the* Vena Cava, *ariſing on the right ſide.*

B

Balneum Mariæ, *Is a way of diſtilling with a Glaſs-belly, holding the Ingredients put into a Veſſel of water, and ſo fire being made under it, it diſtils with the heat of the water.*

Balſamic, *Balſamie, or belonging to Balſam.*

Baſilick Vein, *A large Vein into which the* Axillarie *Vein is carried, called alſo the* Liver vein.

Baſis, *The foundation or foot of a thing.*

Bechicks, *Medicines againſt the Cough.*

Belly, *Upper, the head ſo called.* *Middle, the region of the ſtomach.* *Lower, The parts below the Midriff, containing the Inteſtines.*

Bezoartick, *Belonging or made of the pretious ſtone* Bezoar.

Bezoar, *A pretious ſtone brought out of the* Indies *very Cordial.*

Bile, *Choler.*

Bilary, *Belonging to Bile or Choler, ſometimes applyed to the Veſſel containing the Choler.*

Bipartite, *Divided into two parts.*

Bolus, *Is a Medicine made up into a thick ſubſtance to be ſwallow'd not liquid, but taken on a Knives point.*

Botanick, *Pertaining to herbs or herbie.*

Brachial, *Belonging to the Arm.*

Bronchia, *The griſtly parts about the Wind-pipe.*

Bubos, *Filthy ſwellings about the groin.*

C

Cachexia, *An evil diſpoſition of the Body when all the nutriment turns into evil humors.*

Cachectical, *To ſuch evil ſtate or diſpoſition belonging, or one troubled with ſuch evil diſpoſition.*

Cacochymical, *Full of evil and bad juyce in the body, or of very ill digeſtion.*

Callous, *Hard, fleſhy and brawny.*

Calx, *Aſhes, Lime, ſometimes taken for the remaining*

maining parts of things Chymically drawn off.

Capillaments, *Small hairy threds of the Nerves.*

Caput mortuum, *The dead head, being the laſt thing remaining after ſeveral Chymical extraction and good for nothing but to be flung away, all vertue being extracted.*

Carbuncle, *A red fiery ſore; a Plague-ſore.*

Cardiack, *Cordial, or belonging to the Heart.*

Carotides, *Two Arteries which ariſing out of the Axillary Artery, are carried thorow the ſide of the Neck upwards into the Skull.*

Carthamums, *A little ſeed uſed in Medicines.*

Caruncles, *Little pieces of fleſh.*

Cartilage, *Is a griſtle or tendril, a ſubſtance ſomewhat ſofter than a bone, and harder than a Ligament.*

Cartilaginous, *Griſtly or belonging to, or full of ſuch griſtles.*

Caſſia, *A ſweet ſhrub like Cinamon, alſo a drug that purgeth.*

Cataplaſm, *A Poultis or aſſwaging Plaiſter.*

Catarrh, *A great Rheum falling from the head into the mouth.*

Cathartic, *A purging Medicine.*

Cava vena, *The great Liver-vein going thorow the Body.*

Cavity, *Hollowneſs.*

Cauſtic, } *A Compoſition made to burn a hole in*
Cautery } *the skin and fleſh to make Iſſues.*

Celiac veſſels. *Veſſels belonging to the Belly.*

Celebrated, *Performed or done.*

Cephalalge, *The Head-ach.*

Cephalic, *Belonging to the head, a medicine proper for the head.*

Cephalic vein, *Which ſpringing out of the Axillary vein, paſſes between the firſt and ſecond muſcle of the ſhoulder, and ſo paſſes evidently into the Arm.*

Cephalic arterie, *Conſiſts of two branches which ſpringing out of the great Artery, aſcend up into the head.*

Cerebel, *The hinder part of the Brain from whence the Nerves proceed that ſerve to the vital function.*

Cervical, *Belonging to the Neck.*

Chalybeat, *A medicine made of prepared Steel, or belonging to Steel.*

Characteriſtical, *The notes, ſigns or figures belonging to a Character.*

Chloroſis, *The Green-ſickneſs, or the Virgins diſeaſe.*

Choleduc veſſels, *The veſſels that hold and ſend forth the Gall.*

Chorodeidal, *Belonging to the Net, like to the infoldings about the Brain.*

Chyle, *Is the Juyce or ſubſtance of the meat digeſted.*

Chylification, *The making of Chyle.*

Chyme, *Is the juyce of the meat further digeſted.*

Chronical, *Long and tedious diſeaſes.*

Circumpulſion, *A driving about.*

Claſſes, *Forms or Orders.*

Coalition, *Nouriſhment.*

Coagulation, *A curdling like milk, a turning into a Curd, or a ſeparation of the parts like Curds and Whey.*

Coagulum, *Any thing that cauſeth ſuch a curdling as Rennet.*

Coagulated, *Curdled.*

Coction, *Boyling or ſeething, alſo digeſtion.*

Cohobation, *A dreyning or pouring off from a ſettlement.*

Coindications, *Things to be conſidered with the diſeaſe, alſo ſigns beſides the diſeaſe it ſelf.*

Colcothar, *Droſs of mettals.*

Colical, *Belonging to the diſeaſe called the Colick.*

Colliquation, *A melting together.*

Collation, *A comparing or coupling together.*

Collated, *Compared or coupled together.*

Colliſion, *A ſtriking or knocking together.*

Colocynthida, *Or Coloquintida, a bitter purging Gourd or Apple.*

Colon, *The fifth Gut, or that great Gut in which is ſeated the diſeaſe, called the Colick.*

Colluvies, *A filthy heap of any thing.*

Commiſſures, *The joynting or joyning together of things, as of the skull boues.*

Complication, *A folding together.*

Conarium, *A Kernel ſticking to the outſide of the Brain in the form of a Pine-apple.*

Concatenation, *A chaining or joyning together.*

Concatenated, *Joyned, tyed, or faſtned together.*

Conflagration, *A burning out, or being in a flame, as in great Feavers.*

Conformation, *The framing, faſhioning, or diſpoſition of a thing.*

Congelation, *A freezing or gathering together into an hard ſubſtance, as Ice of Water.*

Congeled, *Frozen, ſtifned.*

Congeſtion, *An heaping or gathering together.*

Conjugation, *A yoking together, a derivation of things of one kind.*

Conſiſtency, *Thickneſs or ſubſtance, as a Jelly.*

Convolutions, *Roulings about, or together, a twiſting together.*

Contexture, *A weaving together, or a framing or compoſition.*

Copula, *A joyning or faſtning together, fettering.*

Corollary, *Addition, vantage, or overplus.*

Corroſive, *Knawing, eating corroding.*

Corrugations, *Wrinkling together.*

Cortex, *The bark, ſhell, or piel, or rind.*

Cortical, *Belonging to the bark, or rind, or piel of a thing.*

Craſis, *The diſpoſition, complexion, temperature or mixture of natural humors.*

Craſs, *Thick.*

Craſſament, *A thickneſs or thick ſetling, as of dregs.*

 Cribrou,

Cribrous, *Sivelike, or that hath holes like a Sive.*
Crude, *Raw, undigeſted.*
Crudities, *Raw and undigeſted humors, or rawneſs, or indigeſtion of any thing.*
Criſis, *Is the time of the turn of the diſeaſe when it either increaſes or diminiſhes, always obſerved by the Phyſitians.*
Critical, *To the Criſis, or ſuch time belonging.*
Cremaſteral, *Muſcles belonging to the Teſticles.*
Crural, *Belonging to the Leg.*
Crucible, *An earthen Veſſel uſed to melt Metals with.*
Cucurbite, *A Glaſs-body with a great Belly, uſed in diſtillations.*
Cuneform, *Wedg-like or in form of a Wedg: a bone ſo ſhap'd.*
Cutaneous, *Belonging to the skin, or skinny.*
Culinarie, *Belonging to the Kitchin.*
Cuticula, *The little thin skin under the Cutis or the upper skin.*
Cutis, *The upper or outward skin of the Body.*

D

Dead head, *The ſame with* Caput mortuum.
Decapulation, *A pouring off.*
Defection, *A failing, weakneſs or infirmity.*
Decoction, *A boyling or ſeething.*
Defecated, *Made free from dregs.*
Deflagration, *A flaming or burning forth.*
Deliquium, *As of the ſalt of* Tartar, *a clear draining, alſo a ſwooning away, or a failing of the ſenſes.*
Delirium, *A raving madneſs, as in Feavers.*
Deltoides, *A muſcle in the top of the Arm, having the figure of a* Delta, *the* Greek *D.*
Demerſed, *Drowned.*
Depauperated, *Made poor or waſted.*
Depraved, *Corrupted or marred.*
Depurated, *Cleanſed from dregs.*
Depuration, *A cleanſing or making pure.*
Deſultory, *Leaping, wavering or inconſtant.*
Diabetes, *The Piſſing evil, a diſeaſe that cauſeth the party troubled therewith almoſt continually to piſs, and in a great quantity a clear and ſweetiſh water.*
Diacodium, *A Syrup to procure ſleep, made of the tops of* Poppy.
Diagnoſis, *Dilucidation, or Knowledg.*
Diagridium, *See* Scammony.
Diaphoreſis, *Evaporation, as by ſweating.*
Diaphoretic, *That cauſeth Evaporation, or ſweating forth of humors.*
Diaphanous, *Clear and ſplendid.*
Diaphragma, *The Midriff that ſeparateth the Heart and Lights from the ſtomach.*
Diapneon, Diapnoe, *A breathing forth.*
Diarrhæa, *A looſneſs of the Belly, without inflammation, a Lask.*
Diaſcordium, *A Cordial medicine made of* Scorum *and other Ingredients.*
Diaſtole, *The riſing up of the Heart or Artery, the contrary motion of Syſtole.*
Diatheſis, *The affection or diſpoſition,*
Diluted, *Rinſed or waſhed.*
Dilucidation, *An explaning or clearing.*
Dioptric, *Belonging to the Perſpective, or a Mathematical Inſtrument, thorow which they look to take the height of a thing.*
Divarications, *A varying or ſevering into parts running up and down, as the Veins and Nerves.*
Diverſory, *A diverting place, or a place to turn of one ſide out of the way.*
Diureſis, *Evacuation by Urin.*
Diuretick, *A Medicine that cauſeth evacuation by Urin.*
Dogmatic, *Stiff in Opinion.*
Duodenum, *The firſt Gut or Inteſtine of twelve fingers long.*
Dura mater, *The hard membrane or tunicle that encompaſſeth the Brain next the skull.*
Dyſcraſie, *Intemperature, as ſome humor or quality abounding in the Body.*
Dyſentery, *A flux of the Belly that corrodes the Bowels and often cauſes blood, called then the* Bloudy flux.
Dyſpathy, *A contrariety of affection.*
Dyſpnœa, *A purſineſs or ſhortneſs of breathing, and a ſtopping of the Conduits of the Lights.*

E

Ebullition, *A boiling up.*
Eccentric, *Without Centre.*
Eccathartic, *Not purging.*
Eccritic, *Not critical*
Edulcorated, *Made ſweet.*
Effervency, Efferveſcency, *A being very hot or inflamed.*
Effluvia, *Things that flow out of the Body, as ſteam and breath thorow the pores of the skin.*
Egeſtion, *A caſting forth as ordure from the Body, or any excrementitious humor.*
Egritude, *Sickneſs or not being well.*
Elaſtick, *That goeth off with a force like Gunpowder, or ſpreads forcibly forth with a jerk.*
Elaterium, *A violent ſtrong purging Medicine.*
Elixation, *A boyling.*
Elixir, *An* Arabian *word for Quinteſſence, high Cordials ſo called.*
Elogie, *A report in praiſe or diſpraiſe of a thing.*
Emanations, *Things that flow or proceed from the Body or its parts; flowing forth.*
Embryo, *The Child before it hath perfect ſhape in the Mothers womb.*
Emiſſaries, *Places that ſends forth any thing as the ſinks of the Body.*
Empirical, *Belonging to an Empirick or of knowledg in Phyſick, got by practice only.*
Empiric, *Such a Phyſitian who hath no judgment, but has all his skill from practice, or by experiments.*

Empyema,

Empyema, *An Impoſthume or collection of corrupt matter with inflammation between the breaſt and the Lungs,*

Empyreuma, *A ſmatch or taſte of the fire, as burnt too, or as in moſt waters newly drawn off by diſtillation.*

Emulgent, Emulging, *Veſſels or Arteries, or Veins: two large Arteries ſo called ſpringing out of the great Artery, which being carried near to the back bone are inſerted into the Reins. Alſo two large Veins which ſpringing out of the* Vena Cava, *under the Ventricle, are carried into the Kidneys.*

Emunctories, *Sinks or cleanſing places for the Body.*

Encephalon, *The head and all its parts.*

Enema, *A Cliſter.*

Energy, *The force, or operation, or virtue of a thing.*

Enervation, *Unnerving, or a looſing of the ſtrength, a weakning or making feeble.*

Enthymiama, Enthymeta, *Medicines uſed to expreſs the flowing of the Blood or other humors to any place.*

Ephemera, *Things of a days laſting: a ſhort Feaver of a day.*

Epidemical, *General, univerſal, publick.*

Ephidroſis, *A ſudden ſweat beginning about the head and breaſt paſſing over the Body, unprofitable and of ſmall uſe for that Evacuation of the diſeaſe: ſometimes taken for ſweating.*

Epigaſtric, *Belonging to the* Epigaſtrium.

Epigaſtrium, *The ſame with* Abdomen, *or the outward part of the Belly, from the Navil to the privy members.*

Epilepſie, *The Diſeaſe called the* Falling-ſickneſs.

Epiphyſis, *Is an addition of ſome bone of a different deſcription to the true bone to which it is annexed: an addition or augmentation.*

Epiſpaſticks, *Certain Medicines uſed for the drawing forth of ulcerous matter.*

Epithema, *Moiſt Medicines uſed to bathe or foment the parts affected.*

Epithymum, Dodder of Time, *uſed to purge Melancholy.*

Equinox, *When the day and night are of an equal length, about the twelfth of* March, *and the twelfth of* September.

Eradicated, *Rooted out.*

Erratic, *Creeping, wandring, or ſtraying.*

Eſcharotic, *A Plaiſter or Salve to heal up a wound, and to bring it to a Cruſt.*

Etymologie, *The true Expoſition or interpretation of a thing.*

Evident, *Plain, clear, manifeſt.*

Eventilated, *Fannowed, or that receives wind.*

Euphorbium, *The Gum of a certain Tree ſo called.*

Excandeſcency, *A growing very hot and burning.*

Excern, *Thruſt out, to purge, or ſift forth.*

Excrementitious, *Belonging to Excrements: filthy, polluted.*

Excretion, *Avoiding the Excrements, or ſuperfluities of the Body.*

Excretory, *To ſuch a thing belonging, that puts forth the excrements of the Body.*

Excreſcences, *Things that grow forth out of the Body, or any other thing beſides the Body, or thing, as Warts or pieces of fleſh.*

Exert, *To ſhew or put forth.*

Exitition, *A ſparkling, boiling, bubling, or leaping up, or forth.*

Exonerate, *To disburden, or diſcharge, to purge forth.*

Expanſion, *A ſtretching forth, ſpreading abroad, or inlarging.*

Expanſed, *Spread out at large, or ſtretched forth.*

Expatiated, *A running forth or about, enlarged.*

Exploſion, *A driving forth with violence.*

Exploded, *Thruſt forth, or driven out.*

Extravaſated, *Put, or let forth of the Veſſels as Blood out of the Veins.*

Extraneous, *Strange, or of another kind.*

Extirpated, *Rooted out, or plucked up by the Roots.*

Extricated, *Delivered, or unintangled.*

Exuberances, *Swellings forth, or riſings up, in the fleſh or other parts.*

F

Fœces, *Dregs.*

Fœculencies, *Dregs or ſettlements.*

Farciments, *Stuffings or fillings of any thing.*

Fermentation, *A fermenting or working, like leaven.*

Fibrils, *Little ſmall ſtrings of Fibres, or of the Nerves or Veins.*

Fibres, *The hairy ſtrings of the Nerves and Veins.*

Fibrated, *That has ſmall and hairy ſtrings.*

Filaments, *Little, thin, ſlender Rags like threds, ſuch as appear in Urin.*

Filter, *To ſtrain: A Strainer.*

Fiſſures, *Clefts, chaps, or diviſions.*

Fiſtulous, *Belonging to a Fiſtula, or ſore running Boil.*

Flatulent, Flatuous, *Windy or full of wind.*

Fluor, *A Flux.*

Fluid, *Flowing or running.*

Fluidity, *Apt to flow, flowing or wetneſs.*

Fornix, *An hollow place in the Brain, bending like an Arch.*

Forum, *A place in* Rome *where Judgments were given, and Cauſes decided.*

Friable, *That may be rub'd to pouder between the Fingers.*

Fricions, *Rubbings.*

Fuliginous, *Sooty, or belonging to Soot.*

Functions, *The Exerciſes or diſcharging of ſome Offices.*
Fuſe, *To melt as Metals.*
Fuſed, *Melted or running, as Metals made liquid.*
Fuſion, *A pouring forth, alſo a melting of Metals or other things.*

G

Ganglia, *Things like the heads of* Muſhrumps *in the Body.*
Ganglioform, *Of the ſhame of* Ganglias, *or the heads of* Muſhrumps.
Galen, *An ancient learned Phyſitian.*
Gargariſms, *Medicines to cleanſe the mouth and throat, and to waſh them from filth.*
Geneſis, *Beginning, Nativity, or Generation.*
Genuine, *True or natural.*
Germination, *A ſpringing or budding, or ſprouting forth, as of Trees in the Spring.*
Geſticulation, *A wanton moving up and down of the Legs and Arms or other parts of the Body, like a Tumbler or Mimick.*
Glandulas, *Are little round Kirnels every where up and down in the fleſh and other parts.*
Glutæi, *Muſcles of the Thigh.*
Gonorrhea, *The running of the Reins, a flux of ſeed or matter at the privy parts of man or woman.*
Grumous, *Clottery like blood when congealed.*

H

Hæmorrage, *An exceſſive flux of Blood at the noſe or elſewhere.*
Halos, *A Circle about the moon or ſtars.*
Hellebore, *The root of an herb uſed in Phyſick, two ſorts, white and black.*
Hepatic, *Belonging to the Liver, and a Medicine proper to cure the diſeaſes of the Liver.*
Hermodactils, *Or Mercuries finger, white and red, uſed in Medicines.*
Heterogeneous, *Of an other kind or Genus, ſtrange, not agreeing.*
Homogeneous, *Of the ſame kind or Genus, agreeable, and ſorting.*
Horizon, *The Circle of the Firmament, terminating our ſight.*
Humid, *Moiſt, wet.*
Hydropic, *That hath the Dropſy, or belonging to the Dropſy.*
Hydrotic, *A Medicine evacuating watery humors.*
Hydragogues, *Medicines that will draw forth the watery humor of thoſe who have the Dropſy.*
Hyoides, *A forked bone like the letter* Y, *ſo called of the* Anatomiſts, *conſiſting of divers ſmall bones which are the ground or foundation of the muſcles of the* Larynx, *and the Tongue and helps to breathing, and ſwallowing down meat and drink.*
Hypercatharſis, *Over-purging, or in extream.*
Hypochondria, *The* Præcordia: *the forepart of the Belly and ſides about the ſhort Ribs and above the Navel, under which lieth the Liver and the ſpleen.*
Hypochondriac, *A windy melancholy bred in the* Hypochondria, *from whence a black phlegm ariſes that infects and troubles the mind, one troubled with ſuch melancholy.*
Hypnotic, *A medicine that cauſes ſleep.*
Hypogaſtrium, *The lower part of the Belly, which reaches from the Navel downwards to the privy parts.*
Hippocrates, *A learned ancient Phyſitian, and the firſt methodizer of Phyſick, and made it Artificial.*
Hippocrates ſleeve, *A long woollen, ſtraining-bag ſharp at the bottom, ſo called, being almoſt in faſhion of a ſleeve or Dublet.*
Hypotheſis, *An argument or matter about which one may diſpute.*
Hypoſtaſis, *A ſubſtance or ſettlement, ſuch as is in the bottom of an Urin.*
Hyſterical, *Belonging to the womb or mother, or troubled with the diſeaſe called the* Mother.

I

Jalap, *A purging Drug.*
Ichor, *The matter or corruption running forth of a ſore, or Ulcer.*
Idiocraſie, *The proper diſpoſition or temperament of a thing or Body.*
Idioſyncraſie, *The property of the temperament of Bodies.*
Idiopathic, *Belonging to the proper paſſion of a diſeaſe, thing or body.*
Idiopathy, *The proper paſſion of a diſeaſe.*
Idea, *The form and figure of a thing conceived in the Imagination.*
Ilion, *The third Gut from the Ventricle, wherein the digeſted food or Chyle waxing thicker begins to reſt; the thin Gut or ſmall Gut.*
Iliack, *Belonging to the Colick: the Colick in extremity. Iliack paſſion.*
Imbecillity, *Weakneſs, feebleneſs.*
Impervious, *That cannot be paſſed or gone thorow.*
Impetigo, *A certain kind of dry Itch or ſcurf like the Leproſy.*
Impetuous, *Violently or with force, as it were ruſhing upon a thing.*
Impregnated, *Filled full with the vertue of a thing, as when any thing is infuſed in a liquid body, communicating its vertue to it.*
Inanition, *Emptineſs.*
Incitement, *A ſtirring up or provoking.*
Indication, *A ſhewing or manifeſting by ſign.*
Indomitable, *Untamable, that cannot be ſubdued.*
Inflated, *Blown or puffed up as a Bladder with wind.*

Ingeſtion, *A putting or pouring into a thing, as meat and drink into the ſtomach.*
Inguinal, *Belonging to the Groin.*
Inordinations, *Diſorderings, irregularities, or out of order.*
Inſipid, *Without taſte or ſmack.*
Inſpiration, *A blowing in, or a drawing in of the breath.*
Intenſe, *Strong, violent, great.*
Intercoſtals, *Between the Ribs, Nerves, ſo called, becauſe deſcending from the Brain, they run between the Ribs, and ſo deſcend to the Inwards.*
Internodia, *Between the joynts or knots, as the ſpaces in a Ratoon Cane between the joynts or knots.*
Internuncius, *A Meſſenger that goes between.*
Interſtitia, *The ſpaces between other diſtances as the ſpaces between the Ribs, or the joyntings of the back-bone.*
Inteſtines, *The Entrails or the Guts.*
Intrinſical, *Inward.*
Inverſe, *A turning inſide out, or outſide in, upſide down, quite contrary.*
Inverted, *Turned wrong-ſide out or upſide down, quite changed from its natural ſcituation.*
Involuntary, *Not with the will, unwilling.*
Irradiation, *A beaming forth or laſting forth beams like the Sun. Sometimes applyed to the ſpirits beaming themſelves forth, or running forth from their Centre like beams.*
Irrigation, *A watering, wetting or moiſtning.*
Irritate, *To provoke, anger or ſtir up.*
Irritated, *Provoked, anger'd, or ſtirred up.*
Iſchuria, *The diſeaſe of the Bladder, the ſtoppage of the Water, when it cannot come forth but by drops and with pain.*
Iſchuretical, *One ſo troubled with that diſtemper.*
Jugular, *Belonging to the Throat, the Throat-vein and Artery.*
Julap, *A cooling Cordial, or a mixed Potion to cool and refreſh the heated ſpirits, uſed in Feavers.*

L

Lactiform, *Like milk, or in the form of milk.*
Languor, *Feebleneſs, failing or decay of ſtrength fainting, or weakneſs of ſpirits.*
Larynx, *The top of the Aſper Artery or the head thereof, which reacheth up to the Mouth or Jaw, which with the bone* Hyoides *joyned thereto, ſerves for breathing and forming of the voyce, or the air into articulate ſounds.*
Laſſitude, *Wearineſs and irkſomneſs.*
Lateral, *Belonging to the ſide.*
Latex, *Liquor or Juyce of any ſort in the Body.*
Laudanum, *A Medicine uſed by Phyſitians to cauſe reſt, given in difficult Caſes.*
Lienary, *Belonging to the Spleen.*
Leipothymy, *A ſwouning or fainting away of the ſpirits.*
Lethiferous, *Deadly, that cauſeth death.*
Leucophlegmacy, *The kind of Dropſy that riſeth of white phlegm throughout all the Body, and makes the fleſh ſpongy.*
Ligature, *A band or ſtring bound hard about the Arm, Leg, or any other part of the Body.*
Limature, *The pouder or duſt that cometh of fileing, the fileings of ſteel or other metals.*
Limpid, *Clear, pure, and bright like Water.*
Linctus, *A Medicine that is to be lick'd with the Tongue.*
Liniments, *Ointments.*
Lixivial, *Belonging to Lie made of Aſhes.*
Lobes, *Lappets, or ſuch as the Liver is diſtinguiſhed into.*
Lochia, *All that comes away from a Woman after ſhe is brought to bed.*
Locomotive, *That moves from place to place.*
Lucophlegmacy, *See* Leucophlegmacy.
Lumbary, *Belonging to the Loins.*
Luxuriat, *To grow rank or abound.*
Lymphic, Lymphatic, *Veſſels that carry or contain the wateriſh humors of the Body.*
Lymphducts, *Water-Carriers, or Conveyors, the ſame ſort of Veſſels which carry forth the wateriſh humors.*

M

Magma, *The blended droſs and feces of ſeveral Metals, as alſo of Chymical Extractions.*
Mammillary, *Proceſſes in the Temples, Bones hanging down like broken brows of Banks repreſenting the faſhion of Teats and Cows Udders.*
Manſorius, Maſſoterie, *A Muſcle, which ſpringing up circularly from the Throat-bone of the upper Jaw, moveth the nether Jaw.*
Mandible, *The Jaw wherein the Teeth are ſet.*
Maſtic, *A certain medicinal Gum.*
Maſticator, *The Pipe or Conduit that conveys the pituitous matter out of the Head into the Mouth.*
Matrace, *A Veſſel uſed for Chymical Diſtillations.*
Maturation, *A ripening.*
Maxillary, Maxillar, *Belonging to the Jaws.*
Mechoacan, *A purging Drug brought from the* Indies.
Meconium, *The juice of the Leaves and heads of* Poppy.
Medaſtinum, *Or* Mediaſtinum: *the thin membrane that divides the middle belly or the Breaſt, from the Throat to the Midriff into two boſoms or hollows: one on the right ſide, the other on the left,*
Medullar, *Marrowy, or belonging to the marrow or pith, or the white ſubſtance of the Brain.*
Membranes, *The little thin skins joyning the bones and ſinews together in ſeveral parts of the body: the upper thin skins of any part.*
Meninges, *The thin skins that enwrap the Brain,*

both of the pia mater & dura mater: *one called the hard, the other the ſoft Meninx.*

Menſtruum, *A preparation made by Chymiſts to diſſolve metals, alſo to extract tinctures and the virtues of medicinal druggs, woods, flowers, herbs,* &c.

Meſentery, *A certain thick fat skin, or the double skin that faſtens the bowels to the back, and each to other.*

Meſeraic, *Veins ariſe, or are rather incloſed in* Meſentery, *being branches of the great vein, by which the Guts are nouriſhed, and the juice of the meat concocted, is conveyed to the Liver to be made blood.*

Mercurie, *Quick-ſilver, and its preparations of it.*

Metaphyſical, *Supernatural; things of ſublime ſpeculation beyond nature.*

Metaſtaſis, *Is tranſlation, or when a diſeaſe removes out of one place into another.*

Metatheſis, *Is tranſpoſing, the puting of one thing for another.*

Miaſm, *Infection or taint.*

Microſcope, *A Perſpective-glaſs to behold minute, and very ſmall bodies, a Magnifying glaſs.*

Millepedes, *The hundred-feeted Creature, and Heſlog-ſows, or Hog-lice.*

Mirabolans, *A certain medicinal fruit brought out of the* Indies.

Modification, *A meaſuring or bringing into meaſure.*

Morbid, } *Sick, corrupt, filthy, or naughty.*
Morbifick, } *That cauſeth the Sickneſs or diſeaſe.*

Mucilage, *Thick boiling up of a thing to a gelly, or thick conſiſtency.*

Munited, *Defended or fortified.*

Muſcles, *Parts of the body that ſerve for motion, ſofter and more fleſhy than the ſinews.*

Muſculous, *Full of Muſcles, or belonging to the Muſcles.*

Myologie, *The doctrine of the Muſcles.*

N.

Narcotick, *Stupifactive, or that makes the part ſenſleſs.*

Nates, *Two prominences in the brain, ſo called becauſe in the form of Buttocks.*

Natiform, *In the form of a Buttock.*

Neoterics, *People or men of late times.*

Nepenthe, *A drink to drive away melancholy.*

Nephritis, *A pain in the reins of the back, alſo the Stone or Gravel in the Reins.*

Nephritic, *One troubled with the pain in the Reins.*

Nerves, *Are the ſinews which convey the ſpirits that ſerve for life and motion through the whole body.*

Neurologie, *The doctrine of the Nerves.*

Nitre, *That as is uſually called Saltpetre: A ſalt taken out of the earth.*

Nitroſulphureous, *Nitre mix'd with Sulphur, or of a nitrous and ſulphureous nature or quality.*

O.

Oblique, *Croſs, traverſe, a ſlope not ſtrait or right.*

Oblong, *Longiſh or ſomewhat long.*

Oeconomie, *A certain order of doing any thing, an houſhold rule, regiment or governance.*

Oeſophagus, *The mouth of the ſtomack.*

Olibanum, *An outlandiſh Gum.*

Opiologie, *The doctrine of Opium.*

Opium, *Made up of the juice of wild poppie, uſed to ſtupifie and bring into a ſenſleſs ſleep.*

Opiats, *Medicines made of Opium for ſome part of its ingredients to cauſe ſleep and eaſe for pains.*

Optic, *Belonging to the ſight, as the Nerves that bring the virtue of ſeeing to the eyes.*

Opopanax, *The juice made of a certain herb.*

Ophthalmic, *A medicine to cure the diſeaſes of the eyes.*

Orgaſm, *Rage or fury.*

Orifice, *The hole of a wound, or the mouth of any thing.*

Origine, *Beginning, riſe or birth of a thing.*

Orbicular, *Of a round form or ſhape.*

Orthopnœa, *Is ſuch a ſtraitneſs of breath, that one cannot breath, or fetch breath without ſtretching out of the neck, or holding it upright.*

Os Pubis, *Is the bone at the bottom of the belly, juſt above the privie member.*

Os Sacrum, *Or the ſacred bone, is the great bone upon which the end of the ridge or back-bone reſteth.*

Oviparous, *Egg-bearing Creatures, or that lays Eggs.*

P.

Panacea, *All-heal, or a plaiſter or medicine to heal all things.*

Pancreas, *Called in an Hog the Sweet-bread. It is a remarkable kirnel placed below the Ventricle, and ſerves for a diviſion of the* Vena porta, *as alſo to defend the Ventricle from touching the back.*

Papillary, *Belonging to the Teats, or like paps or teats of a dug.*

Papillæ, *Little paps, or little pieces of fleſh in the body, ſo called of the ſhape of paps.*

Paracentiſis, *Is an inciſion made to draw forth the water from thoſe ſwelled with the Dropſie, vulgarly called a Tapping.*

Paracelſus, *A famous Dutch Emperick.*

Paradox, *A thing contrary to the common opinion.*

Paralytick, *That is troubled with the Palſie.*

Parallel, *Equal, alike, like a line drawn to write by another.*

Parenchyma, *The ſubſtance of the Liver, Spleen, and Lights, ſuppoſed to be made up of congealed thick blood, therefore ſo called.*

Parotida, Parotides, *The two chief Arteries and Veins on the right and left ſide the throat, going up towards the ears.*

Parotid, *To them belonging.*

Particles, *Little parts or portions of any thing.*

Paroxiſms, *Fits, or the returns of fits, as of an Ague or Feavour.*

Pathetic, *To paſſion belonging, Nerves ſo called by Dr.* Willis.

Pathologie, *The doctrine of the paſſions, alſo as Ætiologie,*

Pathognomic, Pathognotic, *That moveth the affections, or that properly belongs to the thing.*

Pepaſmus, *A kind of a concoction of the humors in the diſeaſe.*

Percolation, *A ſtraining thorow.*

Pericardium, *The thin skin or membrane covering the whole heart like a caſe.*

Peritonæum, *The inner skin or rim of the belly joyned to the Caul, wherewith all the Intrails are covered, called by the Anatomiſts* Siphach.

Peripneumonia, *An Inflammation or Impoſtum of the Lungs, with a ſhortneſs of breath.*

Periſtaltick, *Motion, a certain motion compaſſing about, as in certain Convulſions.*

Perſpiration, *Breathing thorow, as ſweat through the pores of the body.*

Perturbations, *Diſturbings, vexing troubles, diſturbances.*

Pervious, *That many be paſſed through, or that has a paſſage or way through it.*

Peruvian, *Belonging to the Country of* Perue, *as* Peruvian *Balſom thence brought.*

Pharmacy, *The Medicines of the Apothecaries; or the art of making them up.*

Pharmaceuticks, *The part of Phyſick that cureth with Medicines.*

Phænomena, *Appearances of things.*

Philonium, *A Confection made of many ingredients compounded together.*

Philtre, *A potion to cauſe Love; or poyſonous Medicines that operate magically, or not naturally.*

Phlebotomie, *Letting blood, or opening of a Vein.*

Phlegmon, *An Inflammation of the blood, with a red ſwelling.*

Phlegoſis, *The like Inflammation fiery red.*

Phthiſis, *The Conſumption of the Lungs, with a waſting away,*

Phthiſic, *Belonging to that diſeaſe, or that has it.*

Phyſiologie, *The reaſoning of the Nature of a thing, or the ſearching it out.*

Pia Mater, *The thinner inward ſoft skin that inwrappeth the pith and marrow of the brain, and is every where joyned to it; called the thinner and ſoft Meuinx.*

Pica, *The longing diſeaſe of Women with Child.*

Pineal, *Kirnel in the brain, in form of a Pine-apple, called alſo* Conarium.

Pituitous, *Snotty thick phlegmatick matter.*

Plaſtic, *Formative, or that worketh and formeth.*

Plenitude, *Fulneſs or ſtore.*

Plethora, *A fulneſs or plenty of humors in the body, good or bad.*

Pleura, *A skin or membrane which clotheth the ribs on the inſide, which being inflamed by the blood, cauſeth the Diſeaſe called the Pleuriſie.*

Pneumatic, *Windy, or belonging to wind or breath.*

Pneumonic, *One ſick of the diſeaſe of the Lungs.*

Polypus, *A filthy diſeaſe in the noſe, breeding ſtinking and ulcerous fleſh within the noſtrils.*

Pontic, *Belonging to the Sea, or to the Country of* Pontus.

Porta Vena, *Is a Vein that hath many ſmall roots faſtened to the Liver, from whence ariſing grow into one trunk or ſtock, which going forth from between two eminent lobes of the Liver, paſſes into the Gall, Ventricle, Spleen, Meſentery, and Caul, and other parts of the body.*

Pores, *Are the little ſmall holes or breathing places in the skin of the body, through which heat and moiſture inſenſibly breath continually.*

Porous, *Full of ſuch like holes or pores.*

Praxis, *Practice or action.*

Præcipitation, *A caſting down; uſed by the Chyſor a certain way of diſtillation, when the matter is thrown back into the Receiver.*

Præternatural, *Beſides or more than natural; not natural, or beſides nature.*

Præceding, *Going before.*

Prævious, *That went before.*

Præcordia, *The parts about the heart, as the Diaphragma, or midriff ſeparating the heart from the other bowels.*

Præmiſed, *Sent before, or before made known.*

Præpollency, *Of very great force, ſtrength, excellency, or virtue.*

Priapiſmus, *Is a diſeaſe in the Yard, that cauſeth it always to be ſtretch'd forth, and extended without any thing provoking it.*

Primigenious, *The firſt original, not having its beginning or birth of another.*

Procatartic, *Remoet, not next cauſe of a diſeaſe.*

Proceſſes, *The parts of a bone (or other parts) that exceed the natural height or poſture, and are yet dependences of the bone and parts, and proceed or go out from it; as alſo ſome Nerves going forth of other Nerves, being ſtill parts of the main ſtock.*

Profuſions, *A pouring forth, or running, or ſpreading abroad.*

Profluvium, *A flowing of humors, a guſhing forth in abundance, a flood.*

Profligated, *Driven away or overthrown, diſcomfited.*

Prognoſis, *The præſcience or fore-knowledge, or Prognoſtication of the event of the diſeaſe.*

Promptuary, *A Store-houſe, or place where any thing is laid up.*

Prominences, *Bunchings forth, thoſe parts that notably ſhew themſelves above the reſt, as a hill in a plain.*

Prophaſis, *The appearing or ſhewing of a thing.*

Prophylactic, *That part of Phyſick that preventeth and preſerveth from diſeaſes.*
Proſtatæ, *Kernels in the Groyn, or about the privie-members.*
Protenſion, *A ſtretching forth at length.*
Protraction, *A drawing forth at length, alſo a prolonging.*
Protuberance, *A bunching forth above the reſt.*
Protruſion, *A thruſting forward.*
Pſoa, *A great muſcle beginning at the* 11th. *rib, and going through the bowels to the privie-members.*
Pſora, *The ſcabbado, or ſcabbineſs with puſtles.*
Ptyaliſmus, *Salivation, or a great flux of ſpitting.*
Ptiſan, *Decocted Barly, with other ingredients.*
Puretology, *The doctrine, or a diſcourſe of Feavors.*
Pungitive, *Pricking like needles.*
Purulent, *Full of matter or filthy corruption; as a Bile or Impoſtum.*
Pubis, *That part of the privy-parts, where the hair grows.*
Pulſific. *That ſtrikes as the Pulſe or beating of the Arterie, or that cauſes ſuch ſtriking or pulſe.*
Pylorus, *Is the lower mouth of the ſtomach or ventricle, whereby the meat being digeſted, is tranſmitted into the Stomach-gut or Maw-gut.*
Pyramidical, *Of the ſhape or form of a Pyramide, broad at bottom, and ſharp at the top.*
Pyretology, *The doctrine of Feavers, or of fire.*

Q.

Quotidian, *Daily or every day: an Ague that comes every day.*
Quartan, *Every fourth day; an Ague that has two days of intermiſſion, and comes on the fourth day again.*

R.

Ramifications, *Branchings forth like the Veins, Arteries, and Nerves up and down the body, reſembling the ſmall twigs and branchings of Trees.*
Rarefaction, *A making of any thing rare or thin.*
Ratiocination, *Reaſoning, debating, or arguing of a thing, or the faculty of reaſoning.*
Reciprocation, *A returning back, or a mutual partaking of a thing, or depending on another by a mutual conſequence.*
Recrement, *Any ſuperfluous matter, or thing in the blood or body, or any of the parts.*
Redundancy, *Superfluity, overflowing too much of a thing.*
Receſſes, *The private and hidden parts of the body, or any hid place.*
Refection, *A repaſt of meat and drink, a refreſhing.*
Refraction, *A breaking off, or rebounding back.*
Reflexion, *A bending back, or rebounding.*
Refrigerate, *To make cool, or to refreſh with cooling, as fanning one in great heat.*
Regurgitate, *To ſwallow up again; or to ſup up again what it before had parted with.*
Regulus, *The droſs of metals.*
Renal, *Belonging to the Reins.*
Reiterated, *Repeated, or the ſame thing done or performed again.*
Remora, *A ſtop, let, or ſtay to any thing; a figurative ſpeech taken from a little fiſh ſo called, which is ſaid by cleaving to the keel of a ſhip, to ſtay it in its courſe.*
Repletion, *A fulneſs or filling full, or abounding.*
Repullulate, *To bud or ſpring forth again, as trees in the ſpring.*
Reſine, *A Chymical extraction of ſeveral druggs ſo called, being in ſubſtance like to Roſine or Reſine.*
Reſpiration, *A breathing forth or a venting.*
Reſolution, *A diſſolving or unbinding, a looſning.*
Retort, *A Chymical Veſſel.*
Reverberatory, *A furnace by which matter is calcined or conſumed with the flame.*
Rhomboides, *A Geometrical figure with unequal ſides.*
Rhombus, *A Geometrical figure, with equal ſides, but not right angl'd, like a quarry of glaſs.*
Rhubarb, *A root brought out of the* Eaſt-Indies, *almoſt like a dock-root, uſed to purge choler.*
Riſibility, *Laughter, or the faculty of laughing.*
Riverius, *A famous Phyſician.*
Rotation, *A going round like a wheel, a moving round.*
Rudiments, *The firſt beginnings and principles of things.*

S.

Saline, *Saltiſh, or belonging to Salt,*
Salt-peter, *Or Salt of the Rock: A Salt got out of the Earth, contracted from ſeveral dungs of Fowls or other Creatures, as Pigeons, Poultrey, and Cattel, and from the Urines of Beaſts, and is one of the Ingredients of which they make Gun-powder, much uſed in Chymiſtry.*
Sal-prunella, *A Salt made out of Salt-peter.*
Sal-ammoniacus, *A Salt of the Earth, found among the Sands in* Lybia,
Sal-alcali, *Salt of aſhes made of the herb* Kali, *but uſed alſo for the ſalt of other herbs burnt to aſhes, and ſo extracted.*
Salvatella, *Vein: Is a branch, which ſpringing out of a Cephalick Vein, in the outſide of the Cubit, ſtretcheth above the wriſt and extream part of the hand, between the Ring-finger and the little finger.*
Salivate, *To ſpit, or cauſe one to void much ſpittle.*
Salivation, *A great flux of ſpitting, or avoiding of ſpittle more than ordinary at the mouth.*
Sanguineous, *Bloody, or belonging to the blood.*
Sanguification, *The making of blood, or the changing the nouriſhment into blood.*

Sanguiducts,

Sanguiducts, *The Veſſels that carry the blood through the body, as the Veins and Arteries.*

Sarſaparilla, *A drug brought from the* Weſt-Indies, *uſed in many decoctions.*

Sagapenum, *A kind of Gum or Roſin that runs forth of the ſhrub called* Ferula.

Scammony, *The juice of an herb which violently purgeth choler; it is alſo called* Diagridium.

Scapular, *Muſcle; a muſcle belonging to the ſhoulders, and ſerves for the moving of them.*

Scheam, *Is a figure or draught of a thing; alſo taken for an Aſtrological Table of the* 12. *Houſes.*

Schirri & Scirri, *Are hard ſwellings in the fleſh, without pain, but hardly curable.*

Schirrous, *Full of ſuch hard ſwellings.*

Sclerotick, *That is troubled with ſome tumor in the third panicle of the eye, called the* Cornea membrana, *or ſomewhere thereabouts.*

Scorbutick, *That is troubled with the diſeaſe called the* Scorbute *or Scurvey.*

Scordium, *A uſeful herb in Phyſick, having leaves almoſt like Germander.*

Scotomies, Scotomie, *Turnings round; a diſeaſe in the head, when all things ſeem to turn round.*

Scrotum, *The outward skin of the Cods, where the hair grows.*

Scutiform, *In the form of a Shield or Buckler.*

Sedal, *Veins: the Veins in the Fundament.*

Seclusion, *A thruſting forth, or out.*

Secundine, *The After-birth, or that which inwraps the Child, which follows after the Birth of the Child; vulgarly called the After-burthen; of Anatomiſts the* 4th. *membrane of the eye, called* Chorion; *and that firſt clotheth the optic ſinew is called the* Secundine.

Secretion, *A ſeparation or putting apart.*

Secreted, *Separated apart.*

Senna, *Or Sena, the leaves of a Plant, that Purgeth Phlegm, Choler and Melancholy.*

Senſory, *The organ of feeling, or of diſcriminating by the ſenſes; the common ſenſory or ſeat of ſuch organ, placed in the brain.*

Septic. *That hath the force of corrupting or putrifying, or that maketh rotten or ripe the matter in a ſoar.*

Series, *An order, courſe, or ſucceſſion of things, a row or courſe of things orderly one after another.*

Serous, *Humor, the whey or watery humor that accompanieth the blood, and which makes it fluid, and is ſeparated and put off from the blood into the parts of the body.*

Seroſities, *Such ſerous humours abounding.*

Serum, *The whey or watery humor of the blood, the ſubſtance of the ſerous humor.*

Sinus, *A boſom or a hollow turning, or outlet of waters, or an inlet or arm of the Sea.*

Soldanella, *Is the Sea-colewort or Folefoot.*

Solitive, *Looſening, or that maketh the body looſe.*

Solſtices, *Are two, the Summer and the Winter ſolſtice; the firſt is about the twelfth of* June, *when the Sun is neareſt to us, and makes with us the longeſt day; the laſt is about the* 12. *of* December, *when the Sun is at its greateſt diſtance from us, and makes with us the ſhorteſt day.*

Solving, *Looſening or unbinding.*

Solution, *A looſning or weakning, as of the Nerves or joynts.*

Solvent, *That which diſſolveth or openeth the parts of the matter to be wrought upon.*

Spagiric, *Belonging to Alchymie, or to the Chymical art.*

Spaſms, *Cramps or Convulſions of the Nerves.*

Spaſmodic, *Belonging to the Cramp or Convulſion, or hauling of the ſinews.*

Spaſmology, *The doctrine of the Convulſion or Cramp of the ſinews.*

Speculative, *Contemplative or notional.*

Speculation, *A ſeeing or diſcovering a thing by contemplation.*

Species, *A kind more particular than Genus, and may be communicated to more generals; as a Cow and an Horſe are of a different ſpecies, but both Animals or Beaſts.*

Spermatic, *Belonging to the ſperm or ſeed.*

Sphaceliſmus, *A blaſting or a mortification of a part.*

Sphincter, *Is the round muſcle that encompaſſes the mouth of the Arſe-gut, which keeps the excrements from an involuntary coming forth.*

Spine, *The back-bone, or long-joynted bone that goes down the back.*

Spina dorſi, *The ſame; the bone of the back, the Chine.*

Spinal, *Belonging to that bone.*

Spiral, *A turning about, and as it were aſcending.*

Splanchnic, Splanchnical, *Belonging to the Spleen.*

Splenitic, *Troubled with the diſeaſe of the Spleen.*

Spodium, *A ſort of ſoot made out of the making and trying of braſs.*

Spontaneous, *Willingly or of one accord, or by the command of the will.*

Sporadical, *That ſeaſeth not after an uſual manner; diſeaſes that ſeize privatly here and there on People diſperſedly, not generally or epidemically.*

Squinancy, *Or Squincy, is a ſwelling in the throat, with an inflamation.*

Stagmas, *The mixtures of metals, or other Chymical things ſet together to ferment and operate one upon the other.*

Stagnation, *A ſtanding ſtill without motion, as a pool.*

Sternothyroeidal, *Muſcle: A Muſcle which reaches from the* Sternon *to the* Os Pubis.

Sternon, *That part of the breaſt where the ribs meet.*

Stibium, *Antimony.*

Stiptic, *Or* Styptic, *that ſtraitneth, bindeth, or is reſtrictive.*

Strumous, *That belongeth to the Kings evil, or he that hath that diſeaſe.*

Subclavian, *Veſſels: The veſſels that belong to the little ribs of the breaſt.*

Sublimate, *White Mercury, or Quick-ſilver Chymically ſublimed; Mercury ſublimate: of a poyſonous nature.*

Subſide, *To ſink down, or fall to the bottom.*

Subſidiarie, *That cometh for aid, or to help, or bringing aid or help.*

Subaction, *A kneading, working, exerciſing, or bringing under.*

Suffuſion, *A ſpreading abroad, or pouring forth.*

Sudation, *A ſweating,*

Sudorific, *That cauſeth ſweating.*

Sulphur, *Brimſtone which is found in Mines in the Earth, taken alſo for one of the Chymiſts principles.*

Sulphureous, *Brimſtony, or belonging to Brimſtone.*

Superficies, *The outſide, or overmoſt part of any thing.*

Suppuration, *A ripening or gathering together of the matter of a ſore.*

Surculs, *Little or ſmall ſhoots or ſpriggs.*

Sutures, *The joynings together of the bones of the head, which appear as if ſowed together with long ſtitches.*

Symptom, *Is an effect accident, or paſſion following any ſickneſs, or any ſenſible grief joyned with a diſeaſe, beſides the diſeaſe it ſelf, as Head-ach with a Feavor.*

Sympathy, *Is a natural paſſion of one thing to another, or an agreement in qualities.*

Sympathic. *Agreeing in affections or paſſions.*

Symphony, *A conſent or agreement in harmony.*

Sympraxis, *A joynt exerciſing or agreement in practice or action; a conſent in operation.*

Syncope, *A ſwoonding, or a loſs of all ſenſe.*

Synochus, *Is a Feavour without changes or intermiſſions, a continual feavour.*

Syntheſis, *A figure contrary to Analyſis; a conceſſion of ſome things ariſing from the matter.*

Syſtaſis, *Conſtitution.*

Syſtem, *The work or part of ſomething that is conſtituted; or a theam or work compacted of ſeveral parts, a part of which is a Syſtem.*

Syſtole, *Is the motion of the heart and arteries, contrary to Diaſtole, by the which they are contracted, but by this they are dilated.*

Syzygies, *Are the Nerves that carry the ſenſe from the brain to the whole body; alſo the Conjunctions of the Sun, Moon, and Stars.*

T.

Tabes dorſalis, *The mourning of the Chine; a waſting or conſumption of the back.*

Tabid, *Conſumptive, pining, or waſting,*

Tamarinds, *An outlandiſh fruit, good to quench thirſt, and to allay the heat of choler, uſed in Medicines.*

Tarantula, *A little venemous Creature found in* Apulia, *a part of* Italy, *whoſe poyſon being by biting diffuſed through the body, ſtrikes the Nerves with ſtrange tumors and Convulſions, which is only curable by the party ſo bitten, being provoked to continual dancing, by which means the poyſon is evacuated through the pores from the Nerves.*

Tartar, *Is a concreted matter taken from the Lees of Wine, very medicinable.*

Tenacious, *Holding or cleaving faſt.*

Tenaſm, *A great deſire of going to ſtool, and yet can do nothing.*

Tenuous, *Thin, ſlender, or ſmall.*

Tendons, *Certain parts in the top of the Muſcles, which ſerve aptly for the moving of the muſcle, being the lodging place of the animal ſpirits, belonging to the muſcle, and out of which they iſſue into the muſcle; they are harder than the muſcles, yet ſofter than a griſtle or ligature.*

Terreſtrial, *Earthly or belonging to the Earth.*

Teſtes, *Certain tubercles in the brain of a man and beaſts, ſo called becauſe like to the ſtones of a man.*

Tetaniſm, *A kind of Cramp that ſo ſtretcheth forth the member, that it cannot bow or bend any way.*

Texture, *Frame or make of a thing.*

Theorie, *Contemplation, or ſpeculative knowledge of a thing.*

Theriacal, *Or Treacle, a Medicine of a diverſe compoſition invented againſt Poyſons.*

Therapeutick, *The curatory art of medicine, or that which belongs to the curing part.*

Theorem, *An Axiom reſpecting contemplation.*

Theſis, *A poſition, or a general queſtion or argument to be diſcuſſed.*

Thorax, *The breaſt or the middle part of the body, reaching from the throat or neck to the lower ribs.*

Thoracious, *Belonging to the Breaſt or Thorax, or medicines good to help the diſeaſes of the Thorax.*

Tinged, *Dyed or dipped, or that has received a colour.*

Tincture, *A dying or colouring, or the dye or colour of any thing. It is uſed alſo for high Cordials and Chymical medicines, of a liquid ſubſtance, and ſtained with ſome tincture or colour.*

Tolutan, *Balſom: A Balſom brought from the* Indies, *ſo called.*

Topics, *General places or heads for invention; a part of Logick, noting the places of invention.*

Torpedo, *The Cramp-fiſh that benumeth the hands of the Fiſhers, holding the Net or Angle with a ſubtil poyſon.*

Torpor, *A numneſs, heavineſs, or ſtiffneſs and unaptneſs for any motion.*

Torrid, *Dry, burned, or parched.*

Torrified, *Made dry or parched, or burnt or ſcorched.*

Trachea, *The Weaſand or Wind-pipe; the ſharp arterie.*

Tragacanth,

The Table of hard Names.

Tragacanth, *An outland ish Gum, commonly called Gum-dragganth,*

Transpiration, *A breathing through, as a vapor through the pores.*

Transpire, *To breath through, as the humors insensibly through the pores of the skin.*

Trapezial, *Belonging to a Geometrical figure, so called of four sides.*

Troches, *Are little round Cakes made up of powders, and used in medicines.*

Trochlear, *Muscle: A muscle made almost like a windlas or pully, whereby things may be strongly hauled or pulled.*

Tropicks, *Two great imaginary Circles in the Heavens, being of equal distance from the Æquator; the one called the Tropic of* Cancer. *to which the Sun being come, he returns back towards the Tropick of* Capricorn; *to which being come here again, returns towards the Tropic of* Cancer; *being the limits of the Suns progress.*

Tubes, *A Mathematical Instrument, hollow like a pipe.*

Tubercles, *Little swellings or pushes, wealks or weales in the skin or flesh.*

Tubuli, *Small little pipes, the Veins and very small Arteries, or little hollow parts of the bowels so called.*

Tumefied, *Swelled or puffed up.*

Tumor, *An hard rising or swelling in any part of the body, with or without inflamation.*

Turbith, *A root much used in Physick to purge phlegm.*

Turgency, Turgescency, } *A swelling or rising up.*

Turgid, *Swelled or risen up, puffed up, moved very much.*

Tympany, *A kind of dry Dropsie, or windy swelling of the belly, gathered between the* peritoneum *and the bowels, which if it be smitten upon, soundeth almost like a Drum.*

V.

Valves, *A part of the brain, made like folding doors so called.*

Van Helmont, *A Famous Dutch Doctor.*

Vapid, *Dead, decay'd, without tast or smack.*

Vegetation, *A growing, or putting forth, or flourishing as a Plant.*

Vegetal, *Belonging to such a growing or flourishing.*

Vegetable, *That which hath life, and groweth, but not sense, as herbs and trees.*

Vehicle, *That which carrieth or beareth another thing, as the blood is of the animal spirits.*

Vena Porta, *See* Porta Vena.

Vena Cava, *See* Cava Vena,

Venous, *Belonging or appertaining to a Vein.*

Ventricle, *Is the stomach, or that part which receives the meat and drink, being swallowed down and which hath in it self the virtue of digestion.*

Ventricles, *Of the heart, two notable little hollows caverns on each side of the heart.*

Ventricles, *Of the Brain, several notable caverns therein.*

Vermiculations, *Creeping like a Worm, or motions like the creeping of a Worm.*

Vernal, *Belonging to the Spring, or in the time of the Spring.*

Verberation, *A beating or striking.*

Vertigo, *A dizinesse, giddinesse, and turning round within the head. A certain disease, which causeth a turning within the head.*

Vertebral, *Belonging to the joynts of the back-bone.*

Vertebræ, *Those several joyntings and knittings of the back-bone or chine, so called of Anatomists.*

Vesicatories, *Medicines that raise or cause Blisters where applied.*

Veterans, *Old Soldiers, or any thing that hath served long in a place.*

Viaticum, *Voyage provisions, as meat and drink upon a journey.*

Vibration, *A shaking, striking or quavering.*

Vicinity, *Neighbourhood, or nearness of dwelling or being.*

Viscid, *Clammy or sticking like Bird-lime.*

Viscosity, *A clammineſs or glewineſs.*

Viscera, *Are the chief Entrals or Inwards, as Heart, Liver, Lungs, Spleen, the Bowels, &c.*

Vitriol, *Copperas, a certain Mineral found in several Countreys, used in Medicines.*

Vitriolic, *Belonging or appertaining to Vitriol.*

Umbilic, *Belonging to the Navel, or of the likeneſs or shape of the Navel.*

Undulation, *A wavering like the waters, where one follows upon the heels of the others.*

Unctuosity, *An oylineſs or juicineſs.*

Unctuous, *Oylie or juicy.*

Volatile, *That easily flies away, or that is apt to flie or vanish.*

Ureters, *The pipes or passages, by which the Urine passes from the Reins to the Bladder.*

Urinary, *Belonging to the Urine, or the passages of the Urine.*

Uterine, *Belonging or appertaining to the Womb.*

Uvea, *The fourth thin membrane of the eye, called also* Chorion.

W.

Wezand, *The Windpipe or Throat.*

X.

Xeroeus, *Wine: A Spanish Wine so called; I suppose they mean Tent.*

Here ends the Table of hard names.

THE FIRST

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THE THIRD

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